SF 298 MASTER COPY KEEP THIS COPY FOR REPRODUCTION PURPOSES

REPORT DOCUMENTATION PAGE

Form Approved
OMB NO. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	September 1998	Final Progress Report

4. TITLE AND SUBTITLE

Optoelectronic Materials Devices Systems Research

5. FUNDING NUMBERS

DAAL03-92-G-0147

6. AUTHOR(S)

Dr. Nicholas George, Center Director

7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(ES)

The Institute of Optics
University of Rochester
Rochester, NY 14627

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

U.S. Army Research Office
P.O. Box 12211
Research Triangle Park, NC 27709-2211

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

ARO 30367.216-PH-URI

11. SUPPLEMENTARY NOTES

The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other documentation.

12a. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution unlimited.

12 b. DISTRIBUTION CODE

19990104 064

13. ABSTRACT *(Maximum 200 words)*

In the Center for Opto-Electronic Systems Research at the University of Rochester, the primary goal of the faculty is to contribute fundamental scientific knowledge in the critical technology areas of lasers, modulation, optical system design, propagation and coherence, detection theory, signal and image processing, switching, neural networks, and displays. This research impacts on the following topics enumerated in the DoD critical technologies list: Photonics; Signal Processing; Passive Sensors; Software Producibility; and, to a lesser extent, Signature Control; Sensitive Radars; and Machine Intelligence or Robotics. Under the URI program, block funding will also permit us to educate a large number of superior doctoral scholars in a unique environment.

14. SUBJECT TERMS

Optoelectronic materials, devices, systems research

15. NUMBER IF PAGES

16. PRICE CODE

17. SECURITY CLASSIFICATION OR REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18
298-102

ARO-URI Center for
Opto-Electronic Systems Research

Table of Contents

SECTION 1: ABSTRACT AND PRODUCTIVITY CHART

ARO-URI Center for Opto-Electronic Systems Research

Optoelectronic Materials Devices Systems Research

Abstract

In the Center for Opto-Electronic Systems Research at the University of Rochester, the primary goal of the faculty is to contribute fundamental scientific knowledge in the critical technology areas of lasers, modulation, optical system design, propagation and coherence, detection theory, signal and image processing, switching, neural networks, and displays. This research impacts on the following topics enumerated in the DoD critical technologies list: Photonics; Signal Processing; Passive Sensors; Software Producibility; and, to a lesser extent, Signature Control; Sensitive Radars; and Machine Intelligence or Robotics. Research in optics and photonics is inherently broad and encompassing, and significant positive influence can be anticipated across a major sector of our economy, as follows: (a) defense systems, (b) factory and office automation, and (c) communications. In addition to the normal emphasis on refereed publications in the open literature, the nine (9) faculty principals also plan to continue an extensive, successful, innovative program of technology transfer with the appropriate Army laboratories, including seminars, workshops, joint research, and long-term working visits. Furthermore, under the URI program, block funding has enabled us to educate a large number of superior doctoral scholars in a unique environment. This environment includes an eminent, cross-disciplinary faculty, an unexcelled capital facility in electrooptics, and industrial interactions with two major local corporations (Xerox and Eastman Kodak) as well as 25 U.S. corporations who are actively engaged in all aspects of photonics. This program of research is also provided at a reasonable cost to ARO due to substantial cost-sharing and careful management by the University of Rochester.

PRODUCTIVITY CHART†

ARO-URI CENTER FOR
OPTO-ELECTRONIC SYSTEMS RESEARCH

CATEGORY \ YEAR	92-93	93-94	94-95	95-96	96-97	97-98	TOTAL
FACULTY (SEC. 2-1 TO 2-3)	10	10	9	9	9	9	
PUBLICATIONS (CUM: SEC. 3-1 TO 3-16) (BY PI: SEC. 4-1 TO 4.23)	27	40	54	46	33	21	221
PH.D. FELLOWS (19 FROM 86-91) (SEC. 5)	12	6	5	5	7	4 (6)	58

†PAGE REFERENCES ARE INDICATED IN THE ABOVE TABLE.

SECTION 2: SCIENTIFIC PERSONNEL AND PHONE LIST

ARO-URI CENTER FOR
OPTO-ELECTRONIC SYSTEMS RESEARCH

SCIENTIFIC PERSONNEL

Nicholas George Director, ARO-URI Center for Opto-Electronic Systems Research; Wilson Professor of Electronic Imaging; and Professor of Optics and Professor of Electrical Engineering (Ph.D. Electrical Engineering and Physics, California Institute of Technology; M.S. University of Maryland; B.S. University of California, Berkeley)

Novel electronic imaging systems for automatic pattern recognition, imaging through turbulence, fog and smoke, and true-height contour holograms; sub-resolution in color scanning and printing, include dithering and compression

Robert W. Boyd Associate Director, ARO-URI Center for Opto-Electronic Systems Research and Professor of Optics
(Ph.D. Physics, University of California, Berkeley; B.S. Physics, Massachusetts Institute of Technology)

Development of nonlinear optical materials, especially composite materials; applications of nonlinear optics, including optical power limiters, phase conjugate mirrors, optical fiber devices, frequency conversion devices, and optical amplifiers

Govind P. Agrawal Professor of Optics
(Ph.D. and M.S., Indian Institute of Technology, New Delhi, India)

Femtosecond dynamics of semiconductor lasers; feedback induced enhancement of laser noise; soliton amplification and generation in doped fibers; spatio-temporal coupling in nonlinear media and its role in mode locking Ti:sapphire lasers

Dennis G. Hall Director of The Institute of Optics and William F. May Professor of Optics
(Ph.D. Physics, University of Tennessee; B.S. Physics, University of Illinois, Urbana-Champaign)

Semiconductor opto-electronics; broad area, surface-emitting semiconductor lasers

SCIENTIFIC PERSONNEL (CONTINUED)

Susan Houde-Walter Professor of Optics
(Ph.D. and M.S. Optics, University of Rochester; B.A., Sarah Lawrence College)

Optoelectronic materials and design: III-V seminconductors, optical glass, design methods for monolithic integration of optoelectronics

Stephen D. Jacobs Associate Professor of Optics and Senior Scientist at the Laboratory for Laser Energetics
(Ph.D. Optics, University of Rochester)

Polymer liquid crystal flake inks for applications, including reflective paints and pigments, friend/foe discrimination

G. Michael Morris Professor of Optics
(Ph.D. and M.S. Electrical Engineering, California Institute of Technology; B.S. Engineering Physics, University of Oklahoma)

Diffractive optics technology, including optical system design, manufacture of diffractive structures, and subwavelength structured surfaces

Carlos R. Stroud Professor of Optics
(Ph.D. Physics, Washington University; A.B. Physics and Mathematics, Centre College)

Quantum electronics with ultrashort laser pulses, remote sensing with modulated laser fields

Emil Wolf Wilson Professor of Optical Physics, Professor of Physics and Professor of Optics
(Ph.D., Bristol; D.Sc. Edinburgh)

Structure of the focal region; inverse problems, especially diffraction tomography and super-resolution; theory of partial coherence, with applications to radiometry and spectroscopy

ARO-URI Center for Opto-Electronic Systems Research
The Institute of Optics
University of Rochester
Rochester, NY 14627

Faculty Investigator	Phone	FAX	E-Mail Address
Govind Agrawal	(716) 275-4846	(716) 244-4936	gpa@optics.rochester,edu
Robert W. Boyd Associate Director	275-2329	273-1075	boyd@optics.rochester.edu
Nicholas George Director	275-2417	244-6150	ngeorge@troi.cc.rochester.edu
Dennis G. Hall	275-2134	273-1072	hall@optics.rochester.edu
Susan N. Houde-Walter	275-7629	271-1027	shw@optics.rochester.edu
Stephen D. Jacobs	275-4837	275-5960	sjac@lle.rochester.edu
G. Michael Morris	275-5140	271-1027	morris@optics.rochester.edu
Carlos R. Stoud	275-2598	244-4936	stroud@optics.rochester.edu
Emil Wolf	275-4397	473-0687	

SECTION 3: CUMULATIVE LISTING OF PUBLICATIONS

ARO-URI Center for
OPTO-ELECTRONIC SYSTEMS RESEARCH

Cumulative Publication Listing

June 1992 to September 1998

1. "Liquid crystals for laser applications," S. D. Jacobs, K. L. Marshall, and A. Schmid, The Handbook of Laser Science and Technology, CRC. **1995**, 509-577 (1995).

2. "Propagation of Gaussian Schell-model beams in dispersive and absorbing media," W. Wang and E.Wolf, J. Mod. Opt. **39**, 2007-2021 (1992).

3. "Improvement of the photorefractive efficiency of $BaTiO_3$ by γ irradiation," T. R. Moore and R. W. Boyd, Appl. Phys. Lett. **61**, 2015-2017 (1992).

4. "Influence of refractive index nonlinearities on modulation and noise properties of semiconductor lasers," G. P. Agrawal, G. H. Duan and P. Gallion, Elect. Lett. **28**, 1773-1774 (1992).

5. "Neural networks applied to diffraction-pattern sampling," N. George and S. Wang, Appl. Opt. **33**, 3127-3134 (1994).

6. "Optical-feedback-induced chaos and its control in semiconductor lasers," G. R. Gray, A. T. Ryan, G. P. Agrawal, and E. C. Gage, SPIE. **2039**, 45-57 (1993).

7. "Effect of two-photon absorption on the amplification of ultrashort optical pulses," G. P. Agrawal, Phys. Rev. E. **48**, 2316-2318 (1993).

8. "Concept of linewidth enhancement factor in semiconductor lasers: its usefulness and limitations," G. P. Agrawal and C. M. Bowden, IEEE Photo. Tech. Lett. **5**, 640-642 (1993).

9. "Optical-feedback-induced chaos and its control in multimode semiconductor lasers," G. R. Gray, A. T. Ryan, G. P. Agrawal, and E. C. Gage, IEEE J. Quant. Elect. **30**, 668-679 (1994).

10. "Simultaneous amplification and compression of picosecond optical pulses during Raman amplification in optical fibers," C. Headley III and G. P. Agrawal, J. Opt. Soc. Am. B. **10**, #12 , 2383-2389 (1993).

11. "Mechanisms for n-type impurity-induced disordering of AlGaAs/GaAs superlattices," B. L. Olmsted, S. N. Houde-Walter, and R. E. Viturro, Mat. Res. Soc. Symp. Proc. **262**, 867-872 (1992).

12. "Tilted superlattice composition profile determined by photoluminescence and thermal disordering," F. G. Johnson, B. L. Olmsted, S. Chen, and G. W. Wicks, J. Elect. Mat. **22**, 331-334 (1993).

13. "Photomixing of achromatically frequency-modulated incoherent light," N. George and S. Radic, Opt. Lett. **18**, 1038-1040 (1993).

14. "Vacancy-mediated disordering of AlGaAs-GaAs superlattices by group IV or VI impurity in-diffusion," B. L. Olmsted and S. N. Houde-Walter, Appl. Phys. Lett. **62**, 1516-1518 (1993).

15. "Curved grating fabrication techniques for surface-emitting distributed feedback lasers," O. King, T. Erdogan, G. W. Wicks, E. H. Anderson, D. Costello, M. J. Rooks, and D. G. Hall, J. Vac. Sci. Tech. B. **10**, 2974-2978 (1992).

16. "Tilted superlattice composition profile measure by photoluminescence and Raman," F. G. Johnson, B. L. Olmsted, S. Chen, and G. W. Wicks, (S. N. Houde-Walter, faculty investigator), J. Crys. Grth. **127**, 812-815 (1993).

17. "Induced focusing and spatial wave breaking from cross-phase modulation in a self-defocusing medium," A. J. Stentz, M. Kauranen, J. J. Maki, G. P. Agrawal, and R. W. Boyd, Opt. Lett. **17**, 19-21 (1992).

18. "Importance of self-induced carrier-density modulation in semiconductor lasers," G. R. Gray, and G. P. Agrawal, IEEE Photo. Tech. Lett. **4**, 1216-1219 (1992).

19. "Dynamic and noise properties of tunable multielectrode semiconductor lasers including spatial hole burning and nonlinear gain," G. Duan, P. Gallion, and G. P. Agrawal, IEEE J. Quan. Elect. **29**, 844-855 (1993).

20. "Enhancement and inhibition of radiation in cylindrically symmetric, periodic structures," T. Erdogan, K. G. Sullivan, and D. G. Hall, J. Opt. Soc. Am. B. **10**, 391-398 (1993).

21. "Laser instabilities and chaos in inhomogenously broadened dense media," C. M. Bowden, S. Singh, and G. P. Agrawal, J. Mod. Opt. **42**, 101-107 (1995).

22. "Steering of optical beams in nonlinear Kerr media by spatial phase modulation," A. T. Ryan and G. P. Agrawal, Opt. Lett. **18**, 1795-1797 (1993).

23. "Generalized Bloch-Maxwell formulation for semiconductor lasers," C. M. Bowden and G. P. Agrawal, Opt. Comm. **100**, 147-152 (1993).

24. "Transverse instabilities in the polarizations and intensities of counterpropagating light waves," A. L. Gaeta and R. W. Boyd, Phys. Rev. A. **48**, 1610-1624 (1993).

25. "A case study: dual-use technologies and university research initiatives," N. George, B. D. Guenther, and V. Piarulli, Army RD&A Bull. **PB 70-93-6**, 19-23 (1993).

26. "Chaotic dynamics of semiconductor lasers with phase-conjugate feedback," G. R. Gray, D. Huang, and G. P. Agrawal, Phys. Rev. A **49**, 2096-2105 (1994).

27. "Energetics of impurity-free vacancy-mediated disordering of AlGaAs/GaAs superlattices," B. L. Omsted and S. N. Houde-Walter, (*III-V Electronic and Photonic Device Fabrication and Performance*, ed. K.S. Jones, S. J. Pearton, and H. Kanber) Mat. Res. Soc. Sym. Proc. **300**, 391-396 (1993).

28. "Si-induced AlGaAs/GaAs superlattice disordering using a grown-in impurity source and the effects of annealing ambient," B. L. Olmsted and S. N. Houde-Walter, (*III-V Electronic and Photonic Device Fabrication and Performance*, ed. K.S. Jones, S. J. Pearton, and H. Kanber) Mat. Res. Soc. Sym. Proc. **300**, 415-420 (1993).

29. "Al-Ga interdiffusion through group III-vacancy second nearest-neighbor hopping," B. L. Olmsted and S. N. Houde-Walter, Appl. Phys. Lett. **63**, 530-532 (1993).

30. "Disordering and compensation in Si-doped AlGaAs/GaAs superlattices using Ga- and As- rich annealing ambients," B. L. Olmsted and S. N. Houde-Walter, Appl. Phys. Lett. **63**, 1131-1133 (1993).

31. "The migration of bound and leaky solutions to the waveguide dispersion relation," R. E. Smith and S. N. Houde-Walter, J. Lightwave Tech. **11**, 1760-1768 (1993).

32. "Antireflection structured surfaces for the infared spectral region," D. H. Raguin and G. M. Morris, Appl. Opt. **32**, 1154-1167 (1993).

33. "Analysis of antireflection-structured surfaces with contiuous one-dimensional surface profiles," D. H. Raguin and G. M. Morris, Appl. Opt. **32**, 2582-2598 (1993).

34. "Effective medium theory approach to guided-mode resonances," S. M. Norton, D. H. Raguin, and G. M. Morris, OSA Topical meeting on optical design for photonics, Palm Springs, CA, paper OWA8, March 22-24 (1993).

35. "Coherence properties of synchrotron radiation in the space-frequency domain," D. Faklis and G. M. Morris, submitted to the J. Mod. Opt. (1993).

36. "Subwavelength structured surfaces and their applications," D. H. Raguin, S. Norton, and G. M. Morris, SPIE Crit. Rev. of Opt. Sci. and Tech. **CR49**, 234-261 (1993).

37. "Scaling properties in the diffraction of focused waves and an application to scanning beams," G. W. Forbes, Am. J. Phys. **62**, 434-443 (1994).

38. "Curved grating fabrication techniques for concentric-circle grating, surface-emitting semiconductor lasers," R. H. Jordan, O. King, G. W. Wicks, D. G. Hall, E. H. Anderson, and M. J. Rooks, Proceedings of the Conference on Binary Optics, NASA Conference Publication **3227**, 223-235 (1993).

39. "Higher-order coherence functions in the space-frequency domain," G. S. Agarwal and E. Wolf, J. Mod. Opt. **40**, 1489-1496 (1993).

40. "Inverse problems with quasi-homogeneous random media," D. G. Fischer and E. Wolf, J. Opt. Soc. Am. A. **11**, 1128-1135 (1994).

41. "Infrared target simulation enironment for pattern recognition applications," A. E. Savakis and N. George, SPIE Proceedings on International Symposium on Optical Engineering and Photonics in Aerospace Sensing, Orlando, FL, 4-8 April (1994).

42. "Image data coding and compression system utilizing controlled blurring," N. George and B. J. Stossel, patent application July (1993).

43. "Semiclassical dynamics of circular-orbit Rydberg wave packets," M. Mallalieu and C. R. Stroud Jr., Phys. Rev. A. **49**, 2329-2339 (1994).

44. "Backscattering cross section of a roughened sphere," D. J. Schertler and N. George, J. Opt. Soc. Am. A. **11**, 2286-2297 (1994).

45. "Excitation of the classical-limit state of an atom," Z. D. Gaeta, M. W. Noel and C. R. Stroud Jr., Phys. Rev. Lett. **73**, 636-639 (1994).

46. "Radiation from an annular grating on a planar optical waveguide," R. H. Jordan and D. G. Hall, Appl. Phys. Lett. **63**, 3423-3425 (1993).

47. "Self-focusing of chirped optical pulses in nonlinear dispersive media," X. D. Cao, G. P. Agrawal, and C. J. McKinstrie, Phys. Rev. A. **49**, 4085-4092 (1994).

48. "Optimization of optical beam steering in nonlinear Kerr media by spatial phase modulation," X. D. Cao, D. D. Meyerhofer, and G. P. Agrawal, J. Opt. Soc. Am. B. **11**, 2224-2231 (1994).

49. "Ferroelectrics push liquid crystals into new markets," S. Jacobs, K. L. Marshall, R&D Magazine. **November**, 20-22 (1993).

50. "Ultrafast pulse propagation in periodic optical media: a generalized finite-difference time-domain approach," S. Radic and N. George, Opt. Lett. **19**, 1064-1066 (1994).

51. "Phase-shifted fiber Bragg gratings and their application for wavelength demultiplexing," G. P. Agrawal and S. Radic, IEEE Photo. Tech. Lett. **6**, 995-997 (1994).

52. "Infared target simulation and recognition," A. E. Savakis and N. George, Fourth Annual Mohawk Valley IEEE Dual-Use Technologies and Applications Conference, SUNY Institute of Technology at Utica/Rome, NY, 23-26 May, (1994).

53. "Automatic image quality assessment," D. M. Berfanger and N. George, Proceedings of IS&T's 47th Annual Conference, ICPS' 94: The Physics and Chemistry of Imaging Systems, Rochester, NY, 15-20 May (1994).

54. "Novel centering method for overlapping correction in halftoning," S. Wang, K. T. Knox, and N. George, Proceedings of IS&T's 47th Annual Conference, ICPS' 94: The Physics and Chemistry of Imaging Systems, Rochester, NY, 15-20 May (1994).

55. "Controlled blurring in image procesing," B. J. Stossel and N. George, Proceedings of IS&T's 47th Annual Conference, ICPS' 94: The Physics and Chemistry of Imaging Systems, Rochester, NY, 15-20 May (1994).

56. "Effect of beam ellipticity on self-mode locking in lasers," R. E. Bridges, R. W. Boyd, and G. P. Agrawal, Opt. Lett. **18**, 2026-2028 (1993).

57. "Multiple-point impulse responses: controlled blurring and recovery," B. J. Stossel and N. George, Opt. Comm. **121**, 156-165 (1995).

58. "Nonlinear optical susceptibilities of layered composite materials," R. W. Boyd and J. E. Sipe, J. Opt. Soc. Am. B. **11**, 297-303 (1994).

59. "A new method for determining the angular separation of double stars," D. F. V. James, H. C. Kandpal and E. Wolf, Astrophys. J. **445**, 406-410 (1995).

60. "Holographic contouring using tunable lasers," N. George and W. Li, Opt. Lett. **19**, 1879-1881 (1994).

61. "Semiconductor laser dynamics beyond the rate-equation approximation," J. Yao, G. P. Agrawal, P. Gallion, and C. M. Bowden, Opt. Comm. **119**, 246-255 (1995).

62. "Partially coherent sources which generate far fields with the same spatial coherence properties," H. C. Kandpal and E. Wolf, Opt. Comm. **110**, 255-258 (1994).

63. "Autler-Townes effect for an atom in a bichromatic laser field: I. a dressed-atom approach," M. F. Van Leeuwen, S. Papademetriou, and C. R. Stroud, Jr., submitted to Phys. Rev. A. (1994).

64. "Mid-infrared modulation using field-induced scattering in ferroelectronic liquid crystals," K. L. Marshall, S. D. Jacobs, and J. E. Miller, Appl. Opt. **34**, 6704-6713 (1995).

65. "$\lambda/4$-shifted nonlinear periodic structure: theory of low-intensity switching," S. Radic, N. George, and G. P. Agrawal, submitted to Proceedings of the International Symposium on Guided-Wave Optoelectronics. (1994).

66. "Optical switching in $\lambda/4$-shifted nonlinear periodic structures," S. Radic, N. George, and G. P. Agrawal, Opt. Lett. **19**, 1789-1791(1994).

67. "A generalized radon transform for tomographic measurement of ultra-short optical pulses," D. F. V. James and G. S. Agarwal, (E. Wolf, faculty imvestigator), to J. Opt. Soc. Am. B. **12**, 704-708 (1995).

68. "Free-space azimuthal paraxial wave equation: the azimuthal Bessel-Gauss beam solution," R. H. Jordan and D. G. Hall, Opt. Lett. **19**, 427-429 (1994).

69. "Radiation from concentric-circle grating, surface-emittimg planar waveguides: the volume current method," R. H. Jordan and D. G. Hall, Appl. Phys. Lett. **64**, 3077-3079 (1994).

70. "Theory of low-threshold optical switching in nonlinear, phase-shifted, periodic structures," S. Radic, N. George and G. P. Agrawal, J. Opt. Soc. Am. B. **12**, 671-680 (1994).

71. "Coherence and control of atomic electrons," C. R. Stroud, Jr., Proceedings of the Fourteenth International Conference on Atomic Physics, Boulder, CO, American Institute of Physics, New York (1994).

72. "Change of polarization of light beams on propagation in free space," D. F. V. James, (E. Wolf, faculty investigator), J. Opt. Soc. of Am. A. **11**, 1641-1643 (1994).

73. "Inverse problems with quasi-homogeneous random media utilizing scattered pulses," D. G. Fischer and B. Cairns, (E. Wolf, faculty investigator), submitted to J. Mod. Opt. (1994).

74. "On the fundamental theorem of diffraction tomography," E. Wolf, SPIE. **1983**, 618-619 (1993).

75. "Spectral changes in the Mach-Zehnder interferometer," G. S. Agarwal and D. F. V. James, (E. Wolf, faculty investigator), J. Mod. Opt. **40**, 1431-1436 (1993).

76. "A few remarks on the matching conditions at interfaces in electromagnetic theory," D. G. Hall, Am. J. Phys. **63**, 508-512 (1995).

77. "Comment on 'Radiometric measurements and correlation-induced spectral changes,' by K. A. Nugent and J. L. Gardner," E. Wolf, Metrologia. **31**, 311-313 (1994).

78. "Reflection and transmission properties of holographic mirrors and holographic Fabry-Perot filters. III. holographic Fabry-Perot filters," W. Wang, (E. Wolf, faculty investigator), Appl. Opt. **33**, 7883-7894 (1994).

79. "Semiclassical theory of Rydberg wave packet interferometry," M. Mallalieu and C.R. Stroud, Jr., Phys. Rev. A. **51**, 1827-1835 (1995).

80. "Analysis of nonuniform nonlinear distributed feedback structures: generalized transfer matrix method," S. Radic, N. George, and G. P. Agrawal, IEEE J. Quant. Elect. **31**, 1326-1336 (1995).

81. "The classical limit of an atom," M. Nauenberg, C. Stroud and J. Yeazell, Sci. Am. **270**, 44-49 (1994).

82. "Far-zone behavior of focused fields in systems with different Fresnel numbers," W. Wang and E. Wolf, Opt. Comm. **119**, 453-459 (1995).

83. "Generalized Fresnel transforms in optics," D. F. V. James and G. S. Agarwal, in press, J. Mod. Opt. (1994).

84. "Some dynamic features of the preparation of liquid crystalline elastomers," C. J. Twomey, T. N. Blanton, K. L. Marshall, S. H. Chen, and S. D. Jacobs, Liquid Crystals. **19**, 339-344 (1995).

85. "Nonlinear DFB phase-shifted structure: all-optical, low-intensity switching device," S. Radic, N. George, and G. P. Agrawal, LEOS Annual Meeting. (1994).

86. "Pulse compression and spatial phase modulation in normally dispersive nonlinear Kerr media," A. T. Ryan and G. P. Agrawal, Opt. Lett. **20**, 306-308 (1995).

87. "Photoelectron statistics of solitons corrupted by amplified spontaneous emission," T. Yoshino and G. P. Agrawal, Phys. Rev. A. **51**, 1662-1668 (1995).

88. "Linewidth enhancement factor and nonlinear gain in ZnSe semiconductor lasers," J. Yao, G. P. Agrawal, and P. Gallion, IEEE Photon. Tech. Lett. **7**, 149-151 (1995).

89. "Radiation in spherically symmetric structures. I. the coupled-amplitude equations for vector spherical waves," K. G. Sullivan and D. G. Hall, Phys. Rev. A. **50**, 2701-2707 (1994).

90. "Radiation in spherically symmetric structures. II. enhancement and inhibition of dipole radiation in a spherical Bragg cavity," K. G. Sullivan and D. G. Hall, Phys. Rev. A. **50**, 2708-2718 (1994).

91. "Highly directional surface emission from a concentric-circle gratings on planar optical waveguides: the field expansion method," R. H. Jordan and D. G. Hall, J. Opt. Soc. Am. A.**12**, 84 (1994).

92. "Photon-limited image classification with a feedforward neural network," L. A. Saaf and G. M. Morris, Appl. Opt. **34**, 3963-3970 (1995).

93. "Noise properties of a beam propagating through an atomic vapor," V. V. Iruvanti and R. W. Boyd, submitted to Opt. Comm. (1995).

94. "Generalized distributed feedback design: amplification, filtering and switching," S. Radic, N. George, and G. P. Agrawal, SPIE Proceedings. Physics and Simulation of Optoelectronic Devices III. **2399**, 37-48 (1995).

95. "Spectral invariance and non-invariance of light generated by partially coherent sources," E. Wolf, J. Appl. Phys. B. **60**, 303-308 (1995).

96. "Structure of focused fields in systems with large Fresnel numbers," W. Wang, A. T. Friberg, and E. Wolf, J. Opt. Soc. Am. A. **12**, 1947-1953 (1995).

97. "Phase-conjugate optical feedback in semiconductor lasers," G. R. Gray, D. H. DeTienne, and G. P. Agrawal, SPIE Proceedings, Physics and Simulation of Optoelectronic Devices III, **2399**, 713-722 (1995).

98. "Blending polysiloxane glass resins to produce optical films with a specific refractive index," E. M. Korenic and K. L. Marshall, (S. Jacobs, faculty investigator), Opt. and Photo. News. **6**, (1995).

99. "Effect of residual dispersion in the phase-conjugation fiber on dispersion compensation in optical communication systems," M. Yu, G. P. Agrawal, and C. J. McKinstrie, IEEE Photo. Tech. Lett. **7**, 932-934 (1995).

100. "Maxwell-Bloch formulation for semiconductors: effects of coherent coulomb exchange," C. M. Bowden and G. P. Agrawal, Phys. Rev. A. **51**, 4132-4139 (1995).

101. "Pump-wave effects on the propagation of noisy signals in nonlinear dispersive media," M. Yu, G. P. Agrawal, and C. J. McKinstrie, J. Opt. Soc. Am. B. **12**, 1126-1132 (1995).

102. "Semiconductor laser amplifiers," G. P. Agrawal, Semiconductor Lasers: Past, Present and Future, American Institute of Physics, New York, 243-283 (1995).

103. "Modulation instabilities in dispersion-flattened fibers," M. Yu, C. J. McKinstre, and G. P. Agrawal, Phys. Rev. E **52**, 1072-1080 (1995).

104. "Cholesteric liquid crystal inks and paints," E. M. Korenic, S. D. Jacobs, S. M. Faris, and L. Li, submitted to Research Highlights of the Army Research Office - Physics Division. (1994).

105. "Enhanced nonlinear optical response of composite materials," G. L. Fisher, R. W. Boyd, R. J. Gehr, S. A. Jenekhe, J. A. Osaheni, J. E. Sipe, and L. A. Weller-Brophy, Phys. Rev. Lett. **74**, 1871-1874 (1995).

106. "Polarization effects and nonlinear switching in fiber figure-eight lasers," A. J. Stentz and R. W. Boyd, Opt. Lett. **19**, 1462-1464 (1994).

107. "Mutual injection locking of a fibre laser and a DFB semiconductor laser," L. W. Liou, M. Yu, T. Yoshino, and G. P. Agrawal, Elect. Lett. **31**, 41-42 (1995).

108. "Colorimetry of fractured cholesteric liquid crystal polymers," E. M. Korenic, S. D. Jacobs, S. M. Faris, and L. Li, The Third IS&T/SID Color Imaging Conference, IS&T, Springfield, VA, 60-62 (1995).

109. "Principles and development of diffraction tomography," E. Wolf, Current Trends in Optics, ed. by A. Consortin (Academic Press, San Diego, CA), 83-110. (1996).

110. "Second-order design methods for definitive studies of plane-symmetric, two-mirror systems," B. D. Stone and G. W. Forbes, J. Opt. Soc. Am. A. **11**, 3292-3307 (1994).

111. "Illustration of second-order design methods: global merit function plots for a class of projection systems," B. D. Stone and G. W. Forbes, J. Opt. Soc. Am. A. **11**, 3308-3321 (1994).

112. "Failure of the leaky-mode representation near the waveguide mode cutoff," R. E. Smith and S. N. Houde-Walter, Opt. Lett. **20**, 1-3 (1995).

113. "Leaky guiding in nontransparent waveguides," R. E. Smith and S. N. Houde-Walter, J. Opt. Soc. A. **12**, 715-724 (1995).

114. "Modeling ion-exchanged glass photonics: the modified quasi-chemical diffusion coefficient," J. M. Inman, J. L. Bentley, and S. N. Houde-Walter, The Journal of Non-Crystalline Solids **191**, 209-215 (1995).

115. "Spatiotemporal coupling in dispersive nonlinear planar waveguides," A. T. Ryan and G. P. Agrawal, J. Opt. Soc. B. **12**, 2382-2389 (1995).

116. "Local field corrections in linear and nonlinear optics," R. W. Boyd and J. E. Sipe, Nonlinear Optics and Opt. Phys. **2**, 105-122 (1994).

117. "Quantum noise characteristics of nonlinear optical amplifiers," R. W. Boyd, G. S. Agrawal, W. V. Davis, A. L. Gaeta, E. M. Nagasako, and M. Kauranen, Acta Physica Polonica A **86**, 117-126 (1994).

118. "Amplification of vacuum fluctuations by two-beam coupling in atomic vapors," M. Kauranen, A. L. Gaeta, R. W. Boyd, and G. S. Agarwal, Phys. Rev. A. **50**, 929-932 (1994).

119. "Figure-eight fibre laser with largely unbalanced central coupler," A. J. Stentz and R. W. Boyd, Elect. Lett. **30**, 1302-1303 (1994).

120. "Deterministic chaos and nonlinear dynamics in nonlinear optics," R. W. Boyd, Nonlinear Dynamics and Spatial Complexity in Optical Systems, 185-196 (1994).

121. "Quantum statistics of the light generated by phase-conjugate resonators," G. S. Agarwal, A. L. Gaeta, and R. W. Boyd, Phys. Rev. A. **47**, 597-601 (1993).

122. "Quantum-noise limit on optical amplification by two-beam coupling in an atomic vapor," A. L. Gaeta, R. W. Boyd and G. S. Agarwal, Phys. Rev. A. **46**, 4271-4275 (1992).

123. "Polarization-ellipse rotation by induced gyrotropy in atomic vapors," W. V. Davis, A. L. Gaeta, and R. W. Boyd, Opt. Lett. **17**, 1304-1306 (1992).

124. "Local field effects in enhancing the nonlinear susceptibility of optical materials," R. W. Boyd, J. J. Maki, and J. E. Sipe, Nonlinear Opt. 63-76 (1992).

125. "Statistical-noise properties of an optical amplifier utilizing two-beam coupling in atomic-potassium vapor," W. V. Davis, A. L. Gaeta, and R. W. Boyd, submitted to Phys. Rev. (1995).

126. "Nonlinear coupling in self-mode-locked lasers: I general formulation," R. E. Bridges, R. W. Boyd, and G. P. Agrawal, J. Opt. Soc. of Am. B. **13**, 553-559 (1995).

127. "Nonlinear coupling in self-mode-locked lasers: II results," R. E. Bridges, R. W. Boyd, and G. P. Agrawal, , J. Opt. Soc. of Am. B. **13**, 560-569 (1995).

128. "Quantum fluctuations as the origin of laser beam filamentation," E. M. Nagasako and R. W. Boyd, submitted to Phys. Rev. Lett. (1995).

129. "Amplitude and phase fluctuations in simulated brillouin scattering," T. R. Moore, A. L. Gaeta, and R. W. Boyd, submitted to IEEE J. Quant. Elect. (1995).

130. "Excess noise aquired by a laser beam agfter propagating through an atomic-potassium vapor," W. V. Davis, M. Kauranen, E. M. Nagasako, R. J. Gehr, A. L. Gaeta, and R. W. Boyd, submitted to Phys. Rev. (1995).

131. "Enhancement of the uniformity and rotation of large aperture, permanent magnet, tunable faraday rotators," G. L. Fischer, T. R. Moore, and R. W. Boyd, submitted to J. Mod. Opt. (1995).

132. "Dramatically improved transmission of ultrashort solitons through 40 km of dispersion-decreasing fiber," A. J. Stentz, R. W. Boyd and A. F. Evans, submitted to Opt. Lett. (1995).

133. "Effect of frequency chirp on soliton spectral sidebands in fiber lasers," L. W. Liou and G. P. Agrawal, Opt. Lett. **20**, 1286-1288 (1995).

134. "Mode locking in semiconductor lasers by phase-conjugate optical feedback," G. R. Gray, D. H. DeTienne, and G. P. Agrawal, Opt. Lett. **20**, 1295-1297 (1995).

135. "Noise amplification in dispersive nonlinear media," S. B. Cavalcanti, G. P. Agrawal, and M. Yu, Phy. Rev. A. **51**, 4086-4092 (1995).

136. "Solitons in fiber amplifiers beyond the parabolic-gain and rate-equation approximations," L. W. Liou and G. P. Agrawal, Opt. Comm. **124**, 500-504 (1996).

137. "Soliton communication beyond the average-soliton regome," R.-J. Essiambre and G. P. Agrawal, J. Opt. Soc. Am. B. **12**, 2420-2425 (1995).

138. "Control of soliton-soliton and soliton-dispersive wave interactions in high bit-rate communication systems," R.-J. Esssiambre and G. P. Agrawal, Elect. Lett. **31**, 1461-1463. (1995).

139. "Homogeneous and evanescent contributions in scalar near-field diffraction," M. W. Kowarz, (E. Wolf, faculty investigator), App. Opt. **34**, 3055-3063 (1995).

140. "Bessel-beam representation for partially coherent fields," M. W. Kowarz and G. S. Agarwal, (E. Wolf, faculty investigator), J. Opt. Soc. Am. A. **12**, 1325-1330 (1995).

141. "Transmission properties of holographic Fabry-Perot filters," W. Wang, (E. Wolf, faculty investigator), Proceedings of Conference on Applications and Theory of Periodic Structures, part of SPIE's 1995 International Symposium on Optical Science, Engineering and Instrumentation, San Diego, CA, July (1995).

142. "Focusing of partially coherent light in systems of large Fresnel numbers," W. Wang, A. T. Friberg, and E. Wolf, J. Opt. Soc. Am. A. **14**, 491- 496 (1997).

143. "Ultra-high bit rate soliton commmunication systems using dispersion-decreasing fibers and parametric amplifiers," R.-J. Essiambre and G. P. Agrawal, Opt. Lett. **21**, 116-118 (1996).

144. Ultrashort pulse propagation in nonlinear planar optical waveguides," G. P. Agrawal and A. T. Ryan, Guided-Wave Optoelectronics, ed. by T. Tamir et al, Plenum Press, 391-398 (1995).

145. "Low-threshold optical switching in non-uniform nonlinear distributed feedback structures," S. Radic, N. George, and G. P. Agrawal, Opt. and Photo. News **6**, 18-19 (1995).

146. "Correlation-induced spectral changes," E. Wolf and D. F. V. James, Reports on Progress in Physics (IOP Publishg, Bristol and London), **59**, 771-818 (1995).

147. "Noise characteristics and statistics of picosecond stokes pulses generated in optical fibers through stimulated Raman scattering," C. Headley, III, and G. P. Agrawal, IEEE J. Quant. Elect. **31**, 2058-2067 (1995).

148. "Vector beam solutions of Maxwell's wave equations," D. G. Hall. Opt. Lett. **21**, 9-11 (1996).

149. "Enhancement and inhibition of electromagnetic radiation in plane layered media: I. the plane wave spectrum approach to modeling classical effects," K. G. Sullivan and D. G. Hall, submitted to J. Opt. Soc. Am. (1995).

150. "Enhancement and inhibition of electromagnetic radiation in plane layered media: II. enhased fluorescence in optical waveguide sensors," K. G. Sullivan and D. G. Hall, submitted to J. Opt. Soc. Am. (1995).

151 "Diffraction characteristics of the Azimuthal Bessel-Gauss beam," P. L. Greene and D. G. Hall, submitted to J. Opt. Soc. Am. A. (1995).

152. "Efficient and stable implemant of rigorous couple-wave analysis for surface-relief gratings," S. Peng and G. M. Morris, SPIE Annual Meeting, SPIE Proc. **2532**, San Diego, CA July 1995, Conference on: Application and Theory of Periodic Structures. (1995).

153. "Resonant scattering from two-dimensional gratings," Song Peng and G. Michael Morris, J. Opt. Soc. Am. A. **13**, 993-1005 (1996).

154. "Experimental demonstration of resonant anomalies in diffraction from two-dimensional gratings," Song Peng and G. Michael Morris, Opt. Lett. **21**, 549-551 (1996).

155. "Experimental study of resonant grating filters based on two-dimensional gratings," S. Peng and G. M. Morris, SPIE Photonics West, SPIE Proc. **2689**, Diffractive and Holographic Optics, Technology III, San Jose, CA. Jan-Feb (1996).

156. "Highly improved convergence of the coupled-wave method for TM polarization," Philippe Lalanne and G. Michael Morris, Opt. Soc. Am. **13**, 779-784 (1996).

157. "Diffractive optics applied to eyepiece design," M. D. Missig and G. M. Morris, Appl. Opt. **34**, 2452-2461 (1995).

158. "Efficient implement of rigorous coupled-wave analysis for surface relief gratings," S. Peng and G. M. Morris, J. Opt. Soc. Am. A. **12**, 1087-1096 (1995).

159. "Imaging thermal objects with photon-counting detectors," E. A. Watson and G. M. Morris, Appl. Opt. **31**, 4751-4757 (1992).

160. "Mode-partition noise in vertical-cavity surface-emitting lasers," J. Y. Law and G. P. Agrawal, IEEE Photo. Tech Lett. **9**, 437-439 (1997).

161. "Effects of spatial hole-burning on gain switching in vertical-cavity surface-emitting lasers," J. Y. Law and G. P. Agrawal, IEEE J. Quant. Elect. **33**, 462-468 (1997).

162. "Autler-Townes effect for an atom in 100% amplitude-modulated laser field. I. A dressed-atom approach," M. F. Van Leeuwen, S. Papademetriou and C. R. Stroud, Jr., Phys. Rev. A. **53**, 990-996 (1996).

163. "Autler-Townes effect for an atom in 100% amplitude-modulated laser field. II. Experimental results," M. F. Van Leeuwen, S. Papademetriou and C. R. Stroud, Jr., Phys. Rev. A. **53**, 997-1003 (1996).

164. "Spatial feedback effects in nrrow-stripe index-guided semiconductor lasers," J. R. Marciantem G. H. M. van Tartwijk, and G. P. Agrawal, IEEE J. Quant. Elect. **33**, 469-473 (1997).

165. "Nonlinear spatio-temporal dynamics due to transverse-mode competition in gain-switched microcavity semiconductor lasers,"J. Y. Law and G. P. Agrawal, Opt. Commun. **138**, 95-98 (1997).

166. "Excitation of an atomic electron to a coherent superposition of macroscopically distinct states," M. W. Noel and C. R. Stroud, Jr., Phys. Rev. Lett. **77**, 1913-1916 (1996).

167. "Cross-spectrally pure light and the spectral modulation law," D. F. James and E. Wolf, Opt. Comm. **138**, 257-261(1997).

168. "Spatio-temporal characteristics of filamentation in broad-area semiconductor lasers," J. R. Marciante and G. P. Agrawal, IEEE J. Quantum Electron. **33**, 1174-1179 (1997).

169. "Effects of optical feedback on static and dynamic characteristics of vertical-cavity surface-emitting lasers," J.Y. Law and G. P. Agrawal, J. Sel. Top. Quantum Electron. **3**, 353-358 (1997).

170. "Fractional wavefunction revivals in the infinite square well," D.L. Aronstein and C.R. Stroud, Jr., Phys. Rev. A. **55**, 4526-4537 (1997).

171. "Coupled-mode theory of resonant-grating filters," Scott M. Norton, Turan Erdogan, and G. Michael Morris, submitted to J. Opt. Soc. Amer. A (1997).

173. "Young's double-slit interferometry within an atom," Michael W. Noel and C. R. Stroud, Jr., Phys. Rev. Lett. **75**, 1252-1255 (1995).

174. "Spatio-temporal shaping of terahertz pulses," Jake Bromage, Stojan Radic, G. P. Agrawal, C. R. Stroud, Jr., P. M. Fauchet, and Roman Sobolewski, Opt. Lett. **22**, 627- 629 (1997).

175. "Optical mixing of Rydberg angular momenta," John D. Corless and C. R. Stroud, Jr., Phys. Rev. Lett. **79**, 637-640 (1997).

176. "Colorimetry of cholesteric liquid crystals," E. M. Korenic, S. D. Jacobs, S. M. Faris, and L. Li, submitted to Proceedings of "Optics and Imaging in the Information Age" - OSA/IS&T Annual Meeting, Rochester, NY (1996).

177. "Semiconductor laser dynamics for feedback from a finite-penetration-depth phase-conjugate mirror," D.H. DeTienne, G.R.Gray, G.P. Agrawal, and D.Lenstra, IEEE J. Quantum Electron. **33**, 838-844 (1997).

178. "Timing jitter of ultrashort solitons in high-speed communication systems I," R.-J. Essiambre and G. P. Agrawal, J. Opt. Soc. Am. B **14**, 314-322 (1997).

179. "Timing jitter of ultrashort solitons in high-speed communication systems II," R. -J. Essiambre and G. P. Agrawal, J. Opt. Soc. Am. B **14**, 323-330 (1997).

180. "Nonlinear dynamics in the generalized Lorenz-Haken model," G. M. M. van Tartwijk and G. P. Agrawal, Opt. Comm. **133**, 565-577 (1997).

181. "Dispersion-tailored active-fiber solitons," G. H. M. van Tartwijk, R.-J. Essiambre, and G. P. Agrawal, Opt. Lett. **21**, 1978-1980 (1997).

182. "Object recognition and image coding," Nicholas George, B. J. Stossel, and D. M. Berfanger, invited paper presented at Takayanagi Memorial Session, Asia Display '95, Hamamatsu, Japan, October 1995.

183. "Lensless electronic imaging," Nicholas George, Opt. Comm. **133**, 22-26 (1997).

184. "Theory for the propagation of short electromagnetic pulses," Nicholas George and Stojan Radic, Opt Comm. **139**, 1-6 (1997)

185. "Effects of Transverse-mode Competition on Injection Dynamics of Vertical-Cavity Surface-Emitting Lasers," Joanne Y. Law, Guido H. M. van Tartwijk, and Govind P. Agrawal, submitted to the topical issue "Fundamental Nonlinear Dynamics of Semiconductor Lasers," of Quantum & Semiclassical Optics (1997).

186. "Pulsed single-mode dye laser for coherent control experiments," John D. Corless, James A. West, Jake Bromage, and C.R. Stroud, Jr., J. of Scientific Instruments **68**, 2259-2264 (1997).

187. "Chemical structure and the mixed mobile ion effect in silver-for- sodium ion exchange in silicate glasses," J.M. Inman, S.N. Houde-Walter, B.L. McIntrye, Z.M. Liao, R.S. Parker, and V. Simmons, J. of Non-Crystalline Solids **194**, 85-92 (1996).

188. "Temperature Dependence of Silver-Sodium Interdiffusion in Micro-optic Glasses," B. Messerschmidt, B.L. McIntyre, S.N. Houde-Walter, R.R. Andre, and C.H. Hsieh, Optical Materials. **7**, 165-171 (1997).

189. "Desired concentration-dependent ion exchange for micro-optic lenses," B. Messerschmidt, B.L. McIntyre, and S.N. Houde-Walter, Applied Optics **35**, 5670-5676 (1996).

190. "Diffraction from thick transmission refief gratings," D. Schertler and N. George, in review, Appt. Opt. (1998).

191. "Lasing behavior of circular grating surface-emitting semiconductor lasers," R. H. Jordan, D. G. Hall, O. King, G. Wicks and S. Rishton, JOSA B **14**, 449-453(1997).

192. "Feedback-Induced Chaos and Intensity-Noise Enhancement in Vertical-Cavity Surface-Emitting Lasers," J. Y. Law and G.P. Agrawal. Submitted to JOSA B (1997).

193. "Ionic mobility in an ion exchanged silver-sodium boroaluminosilicate glass for micro-optics applications," B. Messerschmidt, C.H. Hsieh, B.L. McIntyre, and S.N. Houde-Walter, submitted to J. Non-Cryst. Sol. (1997).

194. "Visualization of the core-scattering dynamics of Rydberg wave pockets," J. A. West and C.R. Stroud Opt. Exp. 1, 31-38 (1997).

195. "Color gamut of cholesteric liquid crystal films and flakes by standard colorimetry, " E.M. Korenic, S.D. Jacobs, S.M. Faris, and L.Li submitted to Color research and application (1997).

196. "Quantum Fluctuations as the Origin of Laser Beam Filamentation," E. M. Nagasako, R. W. Boyd, and G. S. Agarwal, Coherence and Quantum Optics **VII**, 637-638, edited by J. Eberly, L. Mandel and E. Wolf,Plenum, New York (1996).

197. "Experimental Study of Soliton Propagation through 40 km of Dispersion-Decreasing Fiber," A. J. Stentz, R. W. Boyd, and A. F. Evans, Coherence and Quantum Optics **VII**, 461 edited by by J. Eberly, L. Mandel, and E. Wolf, Plenum, New York (1996).

198. "Influence of Local Field Effects on the Nonlinear Optical Properties of Composite Materials," R. W. Boyd, Proceedings of the SPIE, **2524**, 136-141 (1996).

199. "Nonlinear Optical Response of Layered Composite Materials," R. J. Gehr, G. L. Fischer, R. W. Boyd, and J. E. Sipe, Phys. Rev. A **53**, 2792 (1996).

200. "Electrostrictive Contribution to the Intensity-Dependent Refractive Index of Optical Fibers," E. L. Buckland and R. W. Boyd, Opt. Lett. **21**, 1117-1119, 1996.

201. "The Nonlinear Optical Christiansen Filter as an Optical Power Limiter," G. L. Fischer, R. W. Boyd, T. R. Moore, and J. E. Sipe, Optics Letters, **21**, 1643-1645, (1996).

202. "From Laser Beam Filamentation to Optical Solitons: The Influence of C.H. Townes on the Development of Modern Nonlinear Optics,"E. M. Nagasako, and R. W. Boyd, in Amazing Light, A volume dedicated to Charles Hard Townes on his 80th Birthday, edited by R.Y. Chiao, Springer, New York (1996)

203, "Nonlinear Optics, book chapter ," A. J. Stentz and R. W. Boyd, to appear in the CRC Handbook of Photonics, (1996).

204. "Three Dimensional Simulations of Stimulated Brillouin Scattering with Focused Gaussian Beams," T. R. Moore and R. W. Boyd, Journal of Nonlinear Optical Physics and Materials, **5**, 387-408, (1996).

205. "Nonlinear Optics," A. L Gaeta and R. W. Boyd, Chapter 70 of the Atomic, Molecular and Optical Physics Handbook, edited by G.W.F. Drake, published by the American Institute of Physics, (1996).

206. "Statistical Noise Properties of an Optical Amplifier utilizing Two-Beam Coupling in an Atomic-Potassium Vapor," W. V. Davis, A. L. Gaeta, R. W. Boyd, and G. S. Agarwal, Phys. Rev. A, **53**, 3625-3632, (1996).

207. "Multidimensional Coupling Owing to Optical Nonlinearities, I. General Formulation," R. E. Bridges, R. W. Boyd, and G. P. Agrawal, J. Opt. Soc. Am., **13**, 553, (1996).

208. "Multidimensional Coupling Owing to Optical Nonlinearities II. Results," R. E. Bridges, R. W. Boyd, and G. P. Agrawal, J. Opt. Soc. Am., **13,** 560, (1996).

209. "Theory of Third-Harmonic Generation using Bessel Beams and Self-Phase Matching," S.P. Tewari, H. Huang, and R.W. Boyd, Phys. Rev. A, **54**, 2314-25, (1996).

210. "The Origin of the Nonlinear Optical Susceptibility," R. W. Boyd, published as a book chapter in Laser Sources and Applications, edited by A. Miller and D.M.

Finlayson, copublished by the Scottish Universities Summer School in Physics and the Institute of Physics Publishing, Bristol, (1996).

211. "Optical Properties of Nanostructured Optical Materials," R. J. Gehr and R. W. Boyd, Chemistry of Materials, **8**, 1807-1819, (1996).

212. "Nonlinear Optical Properties of Nanocomposite Materials," R.W. Boyd, R. J. Gehr, G. L. Fischer, and J. E. Sipe, Pure and Applied Optics, **5**, 505-512, (1996).

213. "Vacuum-Field-Induced Filamentation in Laser-Beam Propagation," E. M. Nagasako, R. W. Boyd, and G. S. Agarwal, Phys. Rev. A. , **55**, 1412-1415, (1997).

214. "Observation of a Raman-Induced Inter-Pulse Phase Migration in the Propagation of an Untrahigh-Bit-Rate Coherent Soliton Train," E. L. Buckland , R.W.Boyd, and A.F. Evans, Optics Letters **22**, 454, (1997)

215. "Measurement of the Frequency Response of the Electrostrictive Nonlinearity in Optical Fibers," E. L. Buckland and R. W. Boyd, Optics Letters, **22,** 676, (1997).

216. "Brillouin-enhanced four-wave-mixing vector phase conjugate mirror with beam combining capability," M. W. Bowers, R. W. Boyd, A. K. Hankla, Opt. Lett., **22**, 360-362 (1997).

217. "Nonlinear Optical Response of Porous-Glass-Based Composite Materials," R. J. Gehr, G. L. Fischer, and R. W. Boyd, J. Opt. Soc. Am. B, **14,** 2310-2314, (1997).

218. "Theory of diffraction tomography for quasi-homogeneous random objects," D. G. Fischer and E. Wolf, Opt. Comm. **133**, 17-21 (1997).

219. "Sources of arbitrary state of coherence which generate completely coherent fields outside the source," G. Gbur and E. Wolf, Opt. Lett. **22**, 943-945 (1997).

220. "Scattering in the presence of field discontinuities at boundaries," T. Visser and E. Wolf, Phys. Lett. A, in press.

221. "Remarks on boundary conditions for scalar scattering," T. D. Visser, P. S. Carney, and E. Wolf, submitted to Physics Letters A.

SECTION 4: LISTING OF PUBLICATIONS BY FACULTY INVESTIGATOR

GOVIND P. AGRAWAL

"Influence of refractive index nonlinearities on modulation and noise properties of semiconductor lasers," G. P. Agrawal, G. H. Duan, and P. Gallion, Elect. Lett. **28**, 1773-1774 (1992). **(4)***

"Optical-feedback-induced chaos and its control in semiconductor lasers," G. R. Gray, A. T. Ryan, G. P. Agrawal, and E. C. Gage, SPIE. **2039**, 45-57 (1993). **(6)**

"Effect of two-photon absorption on the amplification of ultrashort optical pulses," G. P. Agrawal, Phys. Rev. E. **48**, 2316-2318 (1993). **(7)**

"Concept of linewidth enhancement factor in semiconductor lasers: its usefulness and limitations," G. P. Agrawal and C. M. Bowden, IEEE Photo. Tech. Lett. **5**, 640-642 (1993). **(8)**

"Optical-feedback-induced chaos and its control in multimode semiconductor lasers," G. R. Gray, A. T. Ryan, G. P. Agrawal, and E. C. Gage, IEEE J. Quant. Elect. **30**, 668-679 (1994). **(9)**

"Simultaneous amplification and compression of picosecond optical pulses during Raman amplification in optical fibers," C. Headley III and G. P. Agrawal, J. Opt. Soc. Am. B. **10**, 2383-2389 (1993). **(10)**

"Induced focusing and spatial wave breaking from cross-phase modulation in a self-defocusing medium," A. J. Stentz, M. Kauranen, J. J. Maki, G. P. Agrawal, and R. W. Boyd, Opt. Lett. **17**, 19-21 (1992). **(17)**

"Importance of self-induced carrier-density modulation in semiconductor lasers," G.R. Gray and G.P. Agrawal, IEEE Photo. Tech. Lett. **4**, 1216-1219 (1992). **(18)**

"Dynamic and noise properties of tunable multielectrode semiconductor lasers including spatial hole burning and nonlinear gain," G. Duan, P. Gallion, and G. P. Agrawal, IEEE J. Quant. Elect. **29**, 844-855 (1993). **(19)**

"Laser instabilities and chaos in inhomogenously broadened dense media," C. M. Bowden, S. Singh, and G.P. Agrawal, J. Mod. Opt. **42**, 101-107 (1995). **(21)**

"Steering of optical beams in nonlinear Kerr media by spatial phase modulation," AT. Ryan and GP. Agrawal, Opt. Lett. **18**, 1795-1797 (1993). **(22)***

"Generalized Bloch-Maxwell formulation for semiconductor lasers," C. M. Bowden and G. P. Agrawal, Opt. Comm. **100**, 147-152 (1993). **(23)**

*File number for cumulative listing.

"Chaotic dynamics of semiconductor lasers with phase-conjugate feedback," G. R. Gray, D. Huang, and G. P. Agrawal, Phys. Rev. A. **49**, 2096-2105 (1994). **(26)**

"Self-focusing of chirped optical pulses in nonlinear dispersive media," X. D. Cao, G. P. Agrawal, and C. J. McKinstrie, Phys. Rev. A. **49**, 4085-4092 (1994). **(47)**

"Optimization of optical beam steering in nonlinear Kerr media by spatial phase modulation," X. D. Cao, D. D. Meyerhofer, and G. P. Agrawal, J. Opt. Soc. Am. B. **11**, 2224-2231 (1994). **(48)**

"Phase-shifted fiber Bragg gratings and their application for wavelength demultiplexing," G. P. Agrawal and S. Radic, IEEE Photo. Tech. Lett. **6**, 995-997 (1994). **(51)**

"Semiconductor laser dynamics beyond the rate-equation approximation," J. Yao, G. P. Agrawal, P. Gallion, and C. M. Bowden, Opt. Comm. **119**, 246-255 (1995). **(61)**

"$\lambda/4$-shifted nonlinear periodic structure: theory of low-intensity switching," S. Radic, N. George, and G. P. Agrawal, Guided-Wave Optoelectronics, ed. by T. Tamir et al, Plenum Press, 399-406 (1995). **(65)**

"Optical switching in $\lambda/4$-shifted nonlinear periodic structures," S. Radic, N. George, and G. P. Agrawal, Opt. Lett. **19**, 1789-1791 (1994). **(66)**

"Theory of low-threshold optical switching in nonlinear, phase-shifted, periodic structures," S. Radic, N. George, and G. P. Agrawal, J. Opt. Soc. Am. B. **12**, 671-680 (1994). **(70)**

"Analysis of nonuniform nonlinear distributed feedback structures: generalized transfer matrix method," S. Radic, N. George, and G. P. Agrawal, IEEE J. Quant. Elect. **31**, 1326-1336 (1995). **(80)**

"Nonlinear DFB phase-shifted structure: all-optical, low-intensity switching device," S. Radic, N. George, and G. P. Agrawal, LEOS Annual Meeting (1994). **(85)**

"Pulse compression and spatial phase modulation in normally dispersive nonlinear Kerr media," A. T. Ryan and G. P. Agrawal, Opt. Lett. **20**, 306-308 (1995). **(86)**

"Photoelectric statistics of solitons corrupted by amplified spontaneous emissions," T. Yoshino and G. P. Agrawal, Phys. Rev. A. **51**, 1662-1668 (1995). **(87)***

*File number for cumulative listing.

"Linewidth enhancement-factor and nonlinear gain in ZnSe semiconductor lasers," J. Yao, G. P. Agrawal, and P. Gallion, IEEE Photo. Tech. Lett. **7**, 149-151 (1995). **(88)**

"Generalized distributed feedback design: amplification, filtering and switching," S. Radic, N. George, and G. P. Agrawal, SPIE Proceedings, Physics and Simulation of Optoelectronic Devices III, **2399**, 37-48 (1995). **(94)**

"Phase-conjugate optical feedback in semiconductor lasers," G. R. Gray, D. H. DeTienne, and G. P. Agrawal, SPIE Proceedings, Physics and Simulation of Optoelectronic Devices III, **2399**, 713-722 (1995). **(97)**

"Effect of residual dispersion compensation in optical commmunicaiton systems," M. Yu, G. P. Agrawal, and C. J. McKinstrie, IEEE Photo. Tech. Lett. **7**, 932-934 (1995). **(99)**

"Maxwell-Bloch formulation for semiconductors: effects of coherent coulomb exchange," C. M. Bowden and G. P. Agrawal, Phys. Rev. A. **51**, 4132-4139 (1995). **(100)**

"Pump-wave effects on the propagation of noisy signals in nonlinear dispersive media," M. Yu, G. P. Agrawal, and C. J. McKinstrie, J. Opt. Soc. Am. B. **12**, 1126-1132 (1995). **(101)**

"Semiconductor laser amplifiers," G. P. Agrawal, Semiconductor Lasers: Past, Present and Future, American Institute of Physics, New York, 243-283 (1995). **(102)**

"Modulation instabilities in dispersion-flattened fibers," M. Yu, C. J. McKinstre, and G. P. Agrawal, Phys. Rev. E **52**, 1072-1080 (1995). **(103)**

"Mutual injection locking of a fibre laser and a DFB semiconductor laser," L. W. Liou, M. Yu, T. Yoshino, and G. P. Agrawal, Elect. Lett. **31**, 41-42 (1995). **(107)**

"Spatio-temporal coupling in dispersive nonlinear plannar waveguides," A. T. Ryan and G. P. Agrawal, J. Opt. Soc. Am. B. **12**, 2382-2389 (1995). **(115)**

"Nonlinear coupling in self-mode-locked lasers: I general formulation," R. E. Bridges, R. W. Boyd, and G. P. Agrawal, J. Opt. Soc. of Am. B. **13**, 553-559 (1995). **(126)**

"Nonlinear coupling in self-mode-locked lasers: II results," R. E. Bridges, R. W. Boyd, and G. P. Agrawal, , J. Opt. Soc. of Am. B. **13**, 560-569 (1995). **(127)**

"Effect of frequency chirp on soliton spectral sidebands in fiber lasers," L. W. Liou and G. P. Agrawal, Opt. Lett. **20**, 1286-1288 (1995). **(133)***

*File number for cumulative listing.

"Mode locking in semiconductor lasers by phase-conjugate optical feedback," G. R. Gray, D. H. DeTienne, and G. P. Agrawal, Opt. Lett. **20**, 1295-1297 (1995). **(134)**

"Noise amplification in dispersive nonlinear media," S. B. Cavalcanti, G. P. Agrawal, M. Yu, Phys. Rev. A. **51**, 4086-4092 (1995). **(135)**

"Solitons in fiber amplifiers beyond the parabolic-gain and rate-equation approximations," L. W. Liou and G. P. Agrawal, Opt. Comm. **124**, 500-504 (1996). **(136)**

"Soliton communication beyond the average-soliton regime," R.-J. Essiambre and G. P. Agrawal, J. Opt. Soc. Am. B. **12**, 2420-2425 (1995). **(137)**

"Control of soliton-soliton and soliton-dispersive wave interaction in high-bit rate communication systems," R.-J. Essiambre and G. P. Agrawal, Elect. Lett. **31**, 1461-1463 (1995). **(138)**

"Ultra-high bit rate soliton communication systems using dispersion-decreasing fibers and parametric amplifiers," R.-J. Essiambre and G. P. Agrawal, Opt. Lett. **21**, 116-118 (1996). **(143)**

"Timing jitter analysis for optical communication systems using ultrashort solitons and dispersion-decreasing fiber," R.-J. Essiambre and G. P. Agrawal, Opt. Comm. **131**, 274-278 (1996). **(144)**

"Low-threshold optical switching in non-uniform nonlinear distributed feedback strucktures," S. Radic, N. George, and G. P. Agrawal, Opt. and Photo. News **6**, 18-19 (1995). **(145)**

"Noise characteristics and statistics of picosecond stokes pulses generated in optical fibers through stimulated Raman scattering," C. Headley III and G. P. Agrawal, IEEE J. Quant. Elect. **31**, 2058-2067 (1995). **(147)**

"Ultrashort pulse propagation in nonlinear planar optical waveguides," G. P. Agrawal and A. T. Ryan, Guided-Wave Optoelectronics, ed. by T. Tamir et al, Plenum Press, 391-398 (1995). **(144)**

"Mode-partition noise in vertical-cavity surface-emitting lasers," J. Y. Law and G. P. Agrawal, IEEE Photo. Tech Lett. **9**, 437-439 (1997). **(160)**

"Effects of spatial hole-burning on gain switching in vertical-cavity surface-emitting lasers," J. Y. Law and G. P. Agrawal, IEEE J. Quant. Elect. **33**, 462-468 (1997). **(161)**

"Spatial feedback effects in nrrow-stripe index-guided semiconductor lasers," J. R. Marciantem G. H. M. van Tartwijk, and G. P. Agrawal, IEEE J. Quant. Elect. 33, 469-473 (1997). **(164)***

*File number for cumulative listing.

"Nonlinear spatio-temporal dynamics due to transverse-mode competition in gain-switched microcavity semiconductor lasers,"J. Y. Law and G. P. Agrawal, Opt. Commun. **138**, 95-98 (1997). **(165)**

"Spatio-temporal characteristics of filamentation in broad-area semiconductor lasers," J. R. Marciante and G. P. Agrawal, IEEE J. Quantum Electron. **33**, 1174-1179 (1997). **(168)**

"Effects of Optical Feedback on Static and Dynamic Characteristics of Vertical-Cavity Surface-Emitting Lasers," J.Y. Law and G. P. Agrawal, submitted to IEEE J. Sel. Top. Quantum Electron. **3**, 353-358 (1997). **(169).**

"Spatio-temporal shaping of terahertz pulses," Jake Bromage, Stojan Radic, G. P. Agrawal, C. R. Stroud, Jr., P. M. Fauchet, and Roman Sobolewski, Opt. Lett., **22**, 627-629 (1997). **(174)**

"Semiconductor laser dynamics for feedback from a finite-penetration-depth phase-conjugate mirror," D.H. DeTienne, G.R. Gray, G.P. Agrawal, and D.Lenstra, IEEE J. Quantum Electron. **33**, 838-844 (1997). **(177)**

"Timing jitter of ultrashort solitons in high-speed communication systems I," R.-J. Essiambre and G. P. Agrawal, J. Opt. Soc. Am. B **14**, 314-322(1997). **(178)**

"Timing jitter of ultrashort solitons in high-speed communication systems II," R. -J. Essiambre and G. P. Agrawal, J. Opt. Soc. Am. B **14**, 323-330 (1997). **(179)**

"Nonlinear dynamics in the generalized Lorenz-Haken model," G. H. M. van Tartwijk and G. P. Agrawal, Opt. Comm. **133**, 565-577 (1997). **(180)**

"Dispersion-tailored active-fiber solitons," G. H. M. van Tartwijk, R.-J. Essiambre, and G. P. Agrawal, Opt. Lett. **21**, 1978-1980 (1996). **(181)**

"Effects of Transverse-Mode Competition on Injection Dynamics of Vertical-Cavity Surface-Emitting Lasers," J.Y. Law, G.H.M. van Tartwijk, and G.P. Agrawal, submitted to Quantum & Semiclassical Optics (1997). **(185)**

"Feedback-Induced Chaos and Intensity-Noise Enhancement in Vertical-Cavity Surface-Emitting Lasers," J.Y. Law and G.P. Agrawal. Submitted to JOSA B (1997). **(192)**.

"Multidimensional Coupling Owing to Optical Nonlinearities I. General Formulation," R. E. Bridges, R. W. Boyd, and G.P. Agrawal, J. Opt. Soc. Am., **13**, 553, (1996). **(207)**

"Multidimensional Coupling Owing to Optical Nonlinearities II. Results," R.E. Bridges, R.W. Boyd and G.P. Agrawal, J. Opt. Soc. Am., **13**, 560, (1996). **(208)**

*File number for cumulative listing.

ROBERT W. BOYD

"Improvement of the photorefractive efficiency of $BaTiO_3$ by γ irradiation," T. R. Moore and R. W. Boyd, Appl. Phys. Lett. **61**, 2015-2017 (1992). **(3)***

"Induced focusing and spatial wave breaking from cross-phase modulation in a self-defocusing medium," A. J. Stentz, M. Kauranen, J. J. Maki, G. P. Agrawal, and R. W. Boyd, Opt. Lett. **17**, 19-21 (1992). **(17)**

"Transverse instabilities in the polarizations and intensities of counterpropagating light waves," A. L. Gaeta and R. W. Boyd, Phys. Rev. A. **48**, 1610-1624 (1993). **(24)**

"Effect of beam ellipticity on self-mode locking in lasers," R. E. Bridges, R. W. Boyd, and G. P. Agrawal, Opt. Lett. **18**, 2026-2028 (1993). **(56)**

"Nonlinear optical susceptibilities of layered composite materials," R. W. Boyd and J. E. Sipe, J. Opt. Soc. Am. B. **11**, 297-303 (1994). **(58)**

"Noise properties of a beam propagating through an atomic vapor," V. V. Iruvanti and R. W. Boyd, submitted to Opt. Comm. (1995). **(93)**

"Enhanced nonlinear optical response of composite materials," G. L. Fisher, R. W. Boyd, R. J. Gehr, S. A. Jenekhe, J. A. Osaheni, J. E. Sipe, and L. A. Weller-Brophy, Phys. Rev. Lett. **74**, 1871-1874 (1995). **(105)**

"Polarization effects and nonlinear switching in fiber figure-eight lasers," A. J. Stentz and R. W. Boyd, Opt. Lett. **19**, 1462-1464 (1994). **(106)**

"Local field corrections in linear and nonlinear optics," R. W. Boyd and J. E. Sipe, Nonlinear Optics and Optical Physics **2**, 105-122 (1994). **(116)**

"Quantum noise characteristics of nonlinear optical amplifiers," R. W. Boyd, G. S. Agarwal, W. V. Davis, A. L. Gaeta, E. M. Nagasako, and M. Kauranen, Acta Physica Polonica A. **86**, 117-126 (1994). **(117)**

"Amplification of vacuum fluctuations by two-beam coupling in atomic vapors, M. Kauranen, A. L. Gaeta, R. W. Boyd, and G. S. Agarwal, Phys. Rev. A. **50**, 929-932 (1994). **(118)**

"Figure-eight fibre laser with largely unbalanced central coupler," A. J. Stentz and R. W. Boyd, Elect. Lett. **30**, 1302-1303 (1994). **(119)**

*File number for cumulative listing.

"Deterministic chaos and nonlinear dynamics in nonlinear optics," R. W. Boyd, Nonlinear Dynamics and Spatial Complexity in Optical Systems. 185-194 (1994). **(120)***

"Quantum statistics of the light generated by phase-conjugate resonators," G. S. Agarwal, A. L. Gaeta, and R. W. Boyd, Phys. Rev. A **47**, 597-601 (1993). **(121)**

"Quantum-noise limit on optical amplification by two-beam coupling in an atomic vapor," A. L. Gaeta, R. W. Boyd, and G. S. Agarwal, Phys. Rev. A. **46**, 4271-4275 (1993). **(122)**

"Polarization-ellipse rotation by induced gyrotrophy in atomic vapors," W. V. Davis, A. L. Gaeta, and R. W. Boyd, Opt. Lett. **17**, 1304-1306 (1992). **(123)**

"Local field effects in enhancing the nonlinear susceptibility of optical materials," R. W. Boyd, J. J. Maki, and J. E. Sipe, Nonlinear Opt. 63-76 (1992). **(124)**

"Statistical-noise properties of an optical amplifier utilizing two-beam coupling in atomic-potassium vapor," W. V. Davis, A. L. Gaeta, and R. W. Boyd, submitted to Phys. Rev. (1995). **(125)**

"Nonlinear coupling in self-mode-locked lasers: I general formulation," R. E. Bridges, R. W. Boyd, and G. P. Agrawal, submitted to J. Opt. Soc. of Am. B. (1995). **(126)**

"Nonlinear coupling in self-mode-locked lasers: II results," R. E. Bridges, R. W. Boyd, and G. P. Agrawal, submitted to J. Opt. Soc. of Am. B. (1995). **(127)**

"Quantum fluctuations as the origin of laser beam filamentation," E. M. Nagasako and R. W. Boyd, submitted to Phys. Rev. Lett. (1995). **(128)**

"Amplitude and phase fluctuations in simulated brillion scattering," T. R. Moore, A. L. Gaeta and R. W. Boyd, submitted to IEEE J. Quant. Elect. (1995). **(129)**

"Excess noise aquired by a laser beam after propagating through an atomic-potassium vapor," W. V. Davis, M. Kauranen, E. M. Nagasako, R. J. Gehr, A. L. Gaeta, and R. W. Boyd, submitted to Phys. Rev. (1995). **(130)**

"Enhancement of the uniformity and rotation of large aperture, permanent magnet, tunable faraday rotators," G. L. Fischer, T. R. Moore, and R. W. Boyd, submitted to J. Mod. Opt. (1995). **(131)**

"Dramatically improved transmisson of ultrashort solitons through 40 km of dispersion-decreasing fiber," A. J. Stentz, R. W. Boyd, and A. F. Evans, submitted to Opt. Lett. (1995). **(132)**

Publications for URI Report

*File number for cumulative listing.

"Quantum Fluctuations as the Origin of Laser Beam Filamentation," E. M. Nagasako, R. W. Boyd, and G. S. Agarwal, Coherence and Quantum Optics **VII**, 637-638, edited by J. Eberly, L. Mandel, and E. Wolf, Plenum, New York, (1996). **(196)**

"Experimental Study of Soliton Propagation through 40 km of Dispersion-Decreasing Fiber," A. J. Stentz, R. W. Boyd, and A. F. Evans, Coherence and Quantum Optics **VII**, 461 edited by J. Eberly, L.Mandel, and E. Wolf, Plenum, New York, (1996). **(197)**

"Influence of Local Field Effects on the Nonlinear Optical Propertiesof Composite Materials," R. W. Boyd, Proceedings of the SPIE, **2524**, 136-141 (1996). **(198)**

"Nonlinear Optical Response of Layered Composite Materials," R. J. Gehr, G. L. Fischer, R. W. Boyd, and J. E. Sipe, Phys. Rev. A **53**, 2792 (1996). **(199)**

"Electrostrictive Contribution to the Intensity-Dependent Refractive Index of Optical Fibers," E. L. Buckland and R. W. Boyd, Opt. Lett. **21**, 1117-1119, 1996. **(200)**

"The Nonlinear Optical Christiansen Filter as an Optical Power Limiter," G. L. Fischer, R. W. Boyd, T. R. Moore, and J. E. Sipe, Optics Letters, **21**, 1643-1645, 1996. **(201)**

"From Laser Beam Filamentation to Optical Solitons: The Influence of C.H. Townes on the Development of Modern Nonlinear Optics," E. M. Nagasako, and R. W. Boyd, in Amazing Light, A volume dedicated to Charles Hard Townes on his 80th Birthday, edited by R.Y. Chiao, Springer, New York, (1996). **(202)**

"Nonlinear Optics, book chapter ," A. J. Stentz and R. W. Boyd, to appear in the CRC Handbook of Photonics, (1996). **(203)**

"Three Dimensional Simulations of Stimulated Brillouin Scattering with Focused Gaussian Beams," T. R. Moore and R. W. Boyd, Journal of Nonlinear Optical Physics and Materials, **5**, 387-408, (1996). **(204)**

"Nonlinear Optics," A. L Gaeta and R. W. Boyd, Chapter 70 of the Atomic, Molecular and Optical Physics Handbook, edited by G.W.F. Drake, published by the American Institute of Physics, (1996). **(205)**

"Statistical Noise Properties of an Optical Amplifier utilizing Two-Beam Coupling in an Atomic-Potassium Vapor," W. V. Davis, A. L. Gaeta, R. W. Boyd, and G. S. Agarwal, Phys. Rev. A, **53**, 3625-3632, (1996). **(206)**

"Multidimensional Coupling Owing to Optical Nonlinearities, I. General Formulation," R. E. Bridges, R. W. Boyd, and G. P. Agrawal, J. Opt.Soc. Am., **13**, 553, (1996). **(207)**

"Multidimensional Coupling Owing to Optical Nonlinearities II. Results," R. E. Bridges, R. W. Boyd, and G. P. Agrawal, J. Opt. Soc. Am., **13,** 560, (1996). **(208)**

"Theory of Third-Harmonic Generation using Bessel Beams and Self-Phase Matching," S.P. Tewari, H. Huang, and R.W. Boyd, Phys. Rev. A, **54**, 2314-25, (1996). **(209)**

"The Origin of the Nonlinear Optical Susceptibility," R. W. Boyd, published as a book chapter in Laser Sources and Applications, edited by A.Miller and D.M. Finlayson, copublished by the Scottish Universities Summer School in Physics and the Institute of Physics Publishing, Bristol, (1996). **(210)**

"Optical Properties of Nanostructured Optical Materials," R. J. Gehr and R. W. Boyd, Chemistry of Materials, **8**, 1807-1819, (1996). **(211)**

"Nonlinear Optical Properties of Nanocomposite Materials," R.W. Boyd, R. J. Gehr, G. L. Fischer, and J. E. Sipe, Pure and Applied Optics, **5**, 505-512, (1996). **(212)**

"Vacuum-Field-Induced Filamentation in Laser-Beam Propagation," E. M. Nagasako, R. W. Boyd, and G. S. Agarwal, Phys. Rev. A. , **55**, 1412-1415, (1997). **(213)**

"Observation of a Raman-Induced Inter-Pulse Phase Migration in the Propagation of an Untrahigh-Bit-Rate Coherent Soliton Train," E. L. Buckland, R. W. Boyd, and A. F. Evans, Optics Letters, **22**, 454, (1997). **(214)**

"Measurement of the Frequency Response of the Electrostrictive Nonlinearity in Optical Fibers," E. L. Buckland and R. W. Boyd, Optics Letters, **22,** 676, (1997). **(215)**

"Brillouin-enhanced four-wave-mixing vector phase conjugate mirror with beam combining capability," M. W. Bowers, R. W. Boyd, A. K. Hankla, Opt. Lett., **22**, 360-362 (1997). **(216)**

"Nonlinear Optical Response of Porous-Glass-Based Composite Materials," R. J. Gehr, G. L. Fischer, and R. W. Boyd, J. Opt. Soc. Am. B, **14,** 2310-2314, (1997). **(217)**

GREGORY W. FORBES

"Scaling properties in the diffraction of focused waves and an application to scanning beams," G. W. Forbes, Am. J. Phys. **62**, 434-443 (1994). **(37)***

"Second-order design methods for definitive studies of plane-symmetric, two-mirror systems," B. D. Stone and G. W. Forbes, J. Opt. Soc. Am. A. **11**, 3292-3307 (1994). **(110)**

"Illustration of second-order design methods: global merit function plots for a class of projection systems," B. D. Stone and G. W. Forbes, J. Opt. Soc. Am. A. **11**, 3308-3321 (1994). **(111)**

*File number for cumulative listing.

NICHOLAS GEORGE

"Neural networks applied to diffraction pattern sampling," N. George and S. Wang, Appl. Opt. **33**, 3127-3134 (1994). **(5)***

"Photomixing of achromatically frequency-modulated incoherent light," N. George and S. Radic, Opt. Lett. **18**, 1038-1040 (1993). **(13)**

"A case study: dual-use technologies and university research initiatives," N. George, B. D. Guenther, and V. Piarulli, Army RD&A Bull. **PB 70-93-6**, 19-23 (1993). **(25)**

"Infrared target simulation environment for pattern recognition applications," A. E. Savakis and N. George, SPIE Proceedings on International Symposium on Optical Engineering and Photonics in Aerospace Sensing, Orlando, FL, 4-8 April (1994). **(41)**

"Image data coding and compression system utilizing controlled blurring," N. George and B. J. Stossel, patent application July (1993). **(42)**

"Backscattering cross section of a roughened sphere," D. J. Schertler and N. George, J. Opt. Soc. Am. A. **11**, 2286-2297 (1994). **(44)**

"Ultrafast pulse propagation in periodic optical media: a generalized finite-difference time-domain approach," S. Radic and N. George, Opt. Lett. **19**, 1064-1066 (1994). **(50)**

"Infared target simulation and recognition," A. E. Savakis and N. George, Fourth Annual Mohawk Valley IEEE Dual-use Technologies and Applications Conference, SUNY Institute of Technology at Utica/Rome, NY, 23-26 May, (1994). **(52)**

"Automatic image quality assessment," D. M. Berfanger and N. George, Proceedings of IS&T's 47th Annual Conference, ICPS' 94: The Physics and Chemistry of Imaging Systems, Rochester, NY, 15-20 May (1994). **(53)**

"Novel centering method for overlapping correction in halftoning," S. Wang, K. T. Knox, and N. George, Proceedings of IS&T's 47th Annual Conference, ICPS' 94: The Physics and Chemistry of Imaging Systems, Rochester, NY, 15-20 May (1994). **(54)**

"Controlled blurring in image procesing," B. J. Stossel and N. George, Proceedings of IS&T's 47th Annual Conference, ICPS' 94: The Physics and Chemistry of Imaging Systems, Rochester, NY, 15-20 May (1994). **(55)***

*File number for cumulative listing.

"Multiple-point impulse responses: controlled blurring and recovery," B. J. Stossel and N. George, Opt. Comm. **121**, 156-165 (1995). **(57)**

"Holographic contouring by using tunable lasers," N. George and W. Li, Opt. Lett. **19**, 1879-1881 (1994). **(60)**

"λ/4-shifted nonlinear periodic structure: theory of low-intensity switching," S. Radic, N. George, and G. P. Agrawal, Guided-Wave Optoelectronics, ed. by T. Tamir et al, Plenum Press, 399-406 (1995). **(65)**

"Optical switching in λ/4-shifted nonlinear periodic structures," S. Radic, N. George, and G. P. Agrawal, Opt. Lett. **19**, 1789-1791 (1994). **(66)**

"Theory of low-threshold optical switching in nonlinear, phase-shifted, periodic structures," S. Radic, N. George, and G. P. Agrawal, J. Opt. Soc. Am. B. **12**, 671-680 (1994). **(70)**

"Analysis of nonuniform nonlinear distributed feedback structures: generalized transfer matrix method," S. Radic, N. George, and G. P. Agrawal, IEEE J. Quant. Elect. **31**, 1326-1336 (1995). **(80)**

"Nonlinear DFB phase-shifted structure: all-optical, low-intensity switching device," S. Radic, N. George, and G. P. Agrawal, LEOS Annual Meeting (1994). **(85)**

"Generalized distributed feedback design: amplification, filtering and switching," S. Radic, N. George, and G. P. Agrawal, SPIE Proceedings, Physics and Simulation of Optoelectronic Devices III. **2399**, 37-48 (1995). **(94)**

"Low-threshold optical switching in non-uniform nonlinear distributed feedback strucktures," S. Radic, N. George, and G. P. Agrawal, Opt. and Photo. **6**, 18-19 (1995). **(145)**

"Object recognition and image coding," Nicholas George, B. J. Stossel, and D. M. Berfanger, invited paper presented at Takayanagi Memorial Session, Asia Display '95, Hamamatsu, Japan, October 1995. **(182)**

"Lensless electronic imaging," Nicholas George, Opt. Comm. **133**, 22-26 (1997). **(183)**

"Theory for the propagation of short electromagnetic pulses, Nicholas George and Stojan Radic, Opt Comm. **139**, 1-6 (1997) **(184)**

"Diffraction from thick transmission relief gratings," D. Schertler and Nicholas George, in review, Appl. Opt. **(190)**

DENNIS G. HALL

"Curved grating fabrication techniques for surface-emitting distributed feedback lasers," O. King, T. Erdogan, G. W. Wicks, E. H. Anderson, D. Costello, M. J. Rooks, and D. G. Hall, J. Vac. Sci. Tech. B. **10**, 2974-2978 (1992). **(15)***

"Enhancement and inhibition of radiation in cylindrically symmetric, periodic structures," T. Erdogan, K. G. Sullivan, and D. G. Hall, J. Opt. Soc. Am. B. **10**, 391-398 (1993). **(20)**

"Curved grating fabrication techniques for concentric-circle grating, surface-emitting semiconductor lasers," R. H. Jordan, O. King, G. W. Wicks, D. G. Hall, E. H. Anderson, and M. J. Rooks, Proceedings of the Conference on Binary Optics, NASA Conference Publication **3227**, 223-235 (1993). **(38)**

"Radiation from an annular grating on a planar optical waveguide," R. H. Jordan and D. G. Hall, Appl. Phys. Lett. **63**, 3423-3425 (1993). **(46)**

"Free-space azimuthal parazial wave equation: the azimuthal Bessel-Gauss beam solution," R. H. Jordan and D. G. Hall, Opt. Lett. **19**, 427-429 (1994). **(68)**

"Radiation from concentric-circle grating, surface-emitting planar waveguides: the volume current method," R. H. Jordan and D. G. Hall, Appl. Phys. Lett. **64**, 3077-3079 (1994). **(69)**

"A few remarks on the matching conditions at interfaces in electromagnetic theory," D. G. Hall, Am. J. Phys. **63**, 508-512 (1995). **(76)**

"Radiation in sperically symmetric structures. I. the coupled-amplitude equations for vector spherical waves," K. G. Sullivan and D. G. Hall, Phys. Rev. A. **50**, 2701-2707 (1994). **(89)**

"Radiation in spherically symmetric structures. II. enhancement and inhibition of dipole radiation in a spherical Bragg cavity," K. G. Sullivan and D. G. Hall, Phys. Rev. A. **50**, 2708-2718 (1994). **(90)**

"Highly directional surface emission from a concentric-circle gratings on planar optical waveguides: the field expansion method," R. H. Jordan and D. G. Hall, J. Opt. Soc. Am. A. **12**, 84-94 (1995). **(91)**

"Vector beam solutions of Maxwell's wave equations," D. G. Hall. Opt. Lett. **21**, 9-11 (1996). **(148)**

"Enhancement and inhibition of electromagnetic radiation in plane layered media: I. the plane wave spectrum approach to modeling classical effects," K. G. Sullivan and D. G. Hall, submitted to J. Opt. Soc. Am. (1995). **(149)***

*File number for cumulative listing.

"Enhancement and inhibition of electromagnetic radiation in plane layered media: II. enhased fluorescence in optical waveguide sensors," K. G. Sullivan and D. G. Hall, submitted to J. Opt. Soc. Am. (1995). **(150)**

"Diffraction characteristics of the Azimuthal Bessel-Gauss beam," P. L. Greene and D. G. Hall, submitted to J. Opt. Soc. Am. A. (1995). **(151)**

"Lasing behavior of circular grating surface-emitting semiconductor lasers," R.H. Jordan, D. G. Hall, O. King, G. Wicks and S. Rishton, JOSA B **14**, 449-453(1997). **(191)**

SUSAN N. HOUDE-WALTER

"Mechanisms for n-type impurity-induced disordering of AlGaAs/GaAs superlattices," B. L. Olmsted, S. N. Houde-Walter, and R. E. Viturro, Mat. Res. Soc. Symp. Proc. **262**, 867-872 (1992). **(11)***

"Tilted superlattice composition profile determined by photoluminescence and thermal disordering," F. G. Johnson, B. L. Olmsted, S. Chen, and G. W. Wicks, (S. N. Houde-Walter, faculty investigator), J. Elect. Mat. **22**, 331-334 (1993). **(12)**

"Vacancy-mediated disordering of AlGaAs-GaAs superlattices by group IV or VI impurity in-diffusion," B. L. Olmsted and S. N. Houde-Walter, Appl. Phys. Lett. **62**, 1516-1518 (1993). **(14)**

"Tilted superlattice composition profile measure by photoluminescence and Raman," F. G. Johnson, B. L. Olmsted, S. Chen, and G. W. Wicks, (S. N. Houde-Walter, faculty investigator), J. Crys. Grth. **127**, 812-815 (1993). **(16)**

"Energetics of impurity-free vacancy-mediated disordering of AlGaAs/GaAs superlattices," B. L. Omsted and S. N. Houde-Walter, (*III-V Electronic and Photonic Device Fabrication and Performance*, ed. K.S. Jones, S. J. Pearton, and H. Kanber) Mat. Res. Soc. Sym. Proc. **300**, 391-396 (1993). **(27)**

"Si-induced AlGaAs/GaAs superlattice disordering using a grown-in impurity source and the effects of annealing ambient," B. L. Olmsted and S. N. Houde-Walter, (*III-V Electronic and Photonic Device Fabrication and Performance*, ed. K. S. Jones, S. J. Pearton, and H. Kanber) Mat. Res. Soc. Sym. Proc. **300**, 415-520 (1993). **(28)**

"Al-Ga interdiffusion through group III-vacancy second nearest-neighbor hopping," B. L. Olmsted and S. N. Houde-Walter, Appl. Phys. Lett. **63**, 530-532 (1993). **(29)**

"Disordering and compensation in Si-doped AlGaAs/GaAs superlattices using Ga- and As- rich annealing ambients," B. L. Olmsted and S. N. Houde-Walter, Appl. Phys. Lett. **63**, 1131-1133 (1993). **(30)**

"The migration of bound and leaky solutions to the waveguide dispersion relation," R. E. Smith and S. N. Houde-Walter, J. Lightwave Tech. **11**, 1760-1768 (1993). **(31)**

"Failure of the leaky-mode representation near the waveguide mode cutoff," R. E. Smith and S. N. Houde-Walter, Opt. Lett. **10**, 1-3 (1995). **(112)***

*File number for cumulative listing.

"Leaky guiding in nontransparent waveguides," R. E. Smith and S. N. Houde-Walter, J. Opt. Soc. Am. A. **12**, 715-724 (1995). **(113)**

"Modeling ion-exchanged glass photonics: the modified quasi-chemical diffusion coefficient," J. M. Inman, J. L. Bently, and S. N. Houde-Walter, submitted to The Journal of Non-Crystalline Solids. (1995). **(114)**

"Chemical structure and the mixed mobile ion effect in silver-for- sodium ion exchange in silicate glasses," J.M. Inman, S.N. Houde-Walter, B.L. McIntrye, Z.M. Liao, R.S. Parker, and V. Simmons, J. of Non-Crystalline Solids **194**, 85-92 (1996) **(187)**.

"Temperature Dependence of Silver-Sodium Interdiffusion in Micro-optic Glasses," B. Messerschmidt, B.L. McIntyre, S.N. Houde-Walter, R.R. Andre, and C.H. Hsieh, Optical Materials. **7**, 165-171 (1997) **(188)**.

"Desired concentration-dependent ion exchange for micro-optic lenses," B. Messerschmidt, B.L. McIntyre, and S.N. Houde-Walter, Applied Optics **35**, 5670-5676 (1996) **(189).**

"Ionic mobility in an ion exchanged silver-sodium boroaluminosilicate glass for micro-optics applications," B.Messerschmidt, C.H. Hsieh, B.L. McIntyre, and S.N. Houde-Walter, submitted to J. Non-Cryst. Sol. (1997) **(193).**

STEPHEN D. JACOBS

"Liquid crystals for laser applications," S. D. Jacobs, K. L. Marshall, and A. Schmid, The handbook of Laser Science and Technology, CRC. **1995**, 509-577 (1995). **(1)***

"Ferroelectrics push liquid crystals into new markets," S. Jacobs and K. L. Marshall, R&D Magazine. **November**, 20-22 (1993). **(49)**

"Mid-infared modulation using field-induced scattering in ferroelectric liquid crystals," K. L. Marshall, S. D. Jacobs, and J. E. Miller, Appl. Opt. **34**, 6704-6713 (1995). **(64)**

"Some dynamic features of the preparation of liquid crystalline elastomers," C. J. Twomey, T. N. Blanton, K. L. Marshall, S. H. Chen, and S. D. Jacobs, Liquid Crystals. **19**, 339-344 (1995). **(84)**

"Blending polysiloxane glass resins to produce optical films with a specific refractive index," E. M. Korenic and K. L. Marshall, (S. D. Jacobs, faculty investigator), Opt. and Photo. News. **6**, (1995). **(98)**

"Cholesteric liquid crystal inks and paints," E. M. Korenic, S. D. Jacobs, S. M. Faris, and L. Li, submitted to Research Highlights of the Army Research Office - Physics Divsion. (1994). **(104)**

"Colorimetry of fractured cholesteric liquid crystal polymers," E. M. Korenic, S. D. Jacobs, S. M. Faris, and L. Li, The third IS&T/SID Color Imaging Conference, (IS&T, Springfield, VA) 60-62 (1995). **(108)**

"Colorimetry of cholesteric liquid crystals," E. M. Korenic, S. D. Jacobs, S. M. Li, submitted to Proceedings of "Optics and Imaging in the Information Age" - OSA/IS&T Annual Meeting, Rochester, NY (1996). **(176)**

"Color gamut of cholesteric liquid crystal films and flakes by standard colorimetry," E. M. Korenic, S. D. Jacobs, S. M. Faris and L. Li, submitted to Color research and application (1997). **(195)**

*File number for cumulative listing.

G. MICHAEL MORRIS

"Antireflection structured surfaces for the infared spectral region," D. H. Raguin and G. M. Morris, Appl. Opt. **32**, 1154-1167 (1993). **(32)***

"Analysis of antireflection-structured surfaces with contiuous one-dimensional surface profiles," D. H. Raguin and G. M. Morris, Appl. Opt. **32**, 2582-2598 (1993). **(33)**

"Effective medium theory approach to guided-mode resonances," S. M. Norton, D. H. Raguin, and G. M. Morris, OSA Topical meeting on optical design for photonics, Palm Springs, CA, paper OWA8, March 22-24 (1993). **(34)**

"Coherence properties of synchrotron radiation in the space-frequency domain," D. Faklis and G. M. Morris, submitted to the J. Mod. Opt. (1993). **(35)**

"Subwavelength structured surfaces and their applications," D. H. Raguin, G. M. Morris, and S. Norton, SPIE Crit. Rev. of Opt. Sci. and Tech. **CR49**, 234-261 (1993). **(36)**

"Photon-limited image classification with a feedback neural network," G. M. Morris, L. A. Saaf, Appl. Opt. **34**, 3963-3970 (1995). **(92)**

"Efficient and stable implement of rigorous couple-wave analysis for surface-relief gratings, S. Peng and G. M. Morris, SPIE Annual Meeting, SPIE Proc. **2532**, San Diego, CA, Conference on: Application and theory of Periodic Structures, (1995). **(152)**

"Resonant scattering from two-dimensional gratings," Song Peng and G. Michael Morris, J. Opt. Soc. Am. A. **13**, 993-1005 (1996). **(153)**

"Experimental demonstration of resonant anomalies in diffraction from two-dimensional gratings," Song Peng and G. Michael Morris, Opt. Lett. **21**, 549-551 (1996). **(154)**

"Experimental study of resonant grating filters based onnn two-dimensional gratings," S. Peng and G. M. Morris, SPIE Photonics West, SPIE Proc. **2689**, Diffractive and Holographic Optics, Technology III, San Jose, CA, Jan-Feb (1996). **(155)**

"Highly improved convergence of the coupled-wave method for TM polarization," Philippe Lalanne and G. Michael Morris, Opt. Soc. Am. **13**, 779-784 (1996). **(156)***

"Diffractive optics applied to eyepiece design," M. D. Missig and G. M. Morris, Appl. Opt. **34**, 2452-2461 (1995). **(157)**

*File number for cumulative listing.

"Efficient implement of rigorous coupled-wave analysis for surface relief gratings," S. Peng and G. M. Morris, J. Opt. Soc. Am. A. **12**, 1087-1096 (1995). **(158)**

"Imaging thermal objects with photon-counting detectors," E. A. Watson and G. M. Morris, Appl. Opt. **31**, 4751-4757 (1992). **(159)**

"Coupled-mode theory of resonant-grating filters," Scott M. Norton, Turan Erdogan, and G. Michael Morris, submitted to J. Opt. Soc. Amer. A (1997). **(171)**

CARLOS R. STROUD, JR.

"Semiclassical dynamics of circular-orbit Rydberg wave packets," M. Mallalieu and C. R. Stroud Jr., Phys. Rev. A. **49**, 2329-2339 (1994). **(43)***

"Excitation of the classical-limit state of an atom," Z. D. Gaeta, M. W. Noel, and C. R. Stroud, Jr., Phys. Rev. Lett. **73**, 636-639 (1994). **(45)**

"Autler-Townes effect for an atom in a bichromatic laser field: I. a dressed-atom approach," M. F. Van Leeuwen, S. Papademetriou, and C. R. Stroud, Jr., submitted to Phys. Rev. A. (1994). **(63)**

"Coherence and control of atomic electrons," C. R. Stroud, Jr., Proceedings of the Fourteenth International Conference on Atomic Physics, Boulder CO, American Institute of Physics, New York. (1994). **(71)**

"Semiclassical theory of Rydberg wave packet interferometry," M. Mallalieu and C.R. Stroud, Jr., Phys. Rev. A. **51**, 1827-1835 (1995). **(79)**

"The classical limit of an atom," M. Nauenberg, C. R. Stroud, Jr., and J. Yeazell, Sci. Am. **270**, 44-49 (1994). **(81)**

"Autler-Townes effect for an atom in 100% amplitude-modulated laser field. I. A dressed-atom approach," M. F. Van Leeuwen, S. Papademetriou and C. R. Stroud, Jr., Phys. Rev. A. **53**, 990-996 (1996). **(162)**

"Autler-Townes effect for an atom in 100% amplitude-modulated laser field. II. Experimental results," M. F. Van Leeuwen, S. Papademetriou and C. R. Stroud, Jr., Phys. Rev. A. **53**, 997-1003 (1996). **(163)**

"Excitation of an atomic electron to a coherent superposition of macroscopically distinct states," M. W. Noel and C. R. Stroud, Jr., Phys. Rev. Lett. **77**, 1913-1916 (1996). **(166)**

"Fractional wavefunction revivals in the infinite square well," D.L. Aronstein and C.R. Stroud, Jr., Phys. Rev. A **55**, 4526-4537 (1997). **(170)**

"Young's double-slit interferometry within an atom," Michael W. Noel and C. R. Stroud, Jr., Phys. Rev. Lett. **75**, 1252-1255 (1995). **(173)**

"Spatio-temporal shaping of terahertz pulses," Jake Bromage, Stojan Radic, G. P. Agrawal, C. R. Stroud, Jr., P. M. Fauchet, and Roman Sobolewski, Opt. Lett. **22**, 627-629 (1997). **(174)***

"Optical mixing of Rydberg angular momenta," John D. Corless and C. R. Stroud, Jr., Phys. Rev. Lett. **79**, 637-640 (1997). **(175)**

*File number for cumulative listing.

"Pulsed single-mode dye laser for coherent control experiments," J.D. Corless, J.A. West, J. Bromage, and C.R. Stroud, Jr., J. of Scientific Instruments **68**, 2259-2264 (1997). **(186).**

"Visualization of the core-scattering dyanmics of Rydberg wave pockets," J.A. West and C.R. Stroud, Jr. Opt. Exp. **1**, 31-38 (1997) **(194).**

EMIL WOLF

"Propagation of Gaussian Schell-model beams in dispersive and absorbing media," W. Wang and E. Wolf, J. Mod. Opt. **39**, 2007-2021 (1992). **(2)***

"Higher-order coherence functions in the space-frequency domain," G. S. Agarwal and E. Wolf, J. Mod. Opt. **40**, 1489-1496 (1993). **(39)**

"Inverse problems with quasi-homogeneous random media," D. G. Fischer and E. Wolf, J. Opt. Soc. Am. A **11**, 1128-1135 (1994). **(40)**

"A new method for determining the angular separation of double stars," D. F. V. James, H. C. Kandpal, and E. Wolf, Astrophys. J. **445**, 406-410 (1995). **(59)**

"Partially coherent sources which generate far fields with the same spatial coherence properties," H. C. Kandpal and E. Wolf, Opt. Comm. **110**, 255-258 (1994). **(62)**

"A generalized radon transform for tomographic measurement of ultra-short optical pulses," D. F. V. James and G. S. Agarwal, (E. Wolf, faculty investigator), J. Opt. Soc. Am. B. **12**, 704-708 (1995). **(67)**

"Change of polarization of light beams on propagation in free space," D. F. V. James, (E. Wolf, faculty investigator), J. Opt. Soc. Am. A. **11**, 1641-1643 (1994) **(72)**

"Inverse problems with quasihomogeneous random media utilizing scattered pulses," D. G. Fisher and B. Cairns, (E. Wolf, faculty investigator), J. Mod. Opt. **42**, 655-666 (1995). **(73)**

"On the fundamental theorem of diffraction tomography," E. Wolf, SPIE. **1983**, 618-619 (1993). **(74)**

"Spectral changes in the Mach-Zehnder interferometer," G. S. Agarwal and D. F. V. James, (E. Wolf, faculty investigator), J. Mod. Opt. **40**, 1431-1436 (1993). **(75)**

"Comment on 'Radiometeric measurements and correlation-induced spectral changes,' by K. A. Nugent and J. L. Gardner," E. Wolf, Metrologia. **31**, 311-313 (1994). **(77)**

"Reflection and transmission properties of holographic mirrors and holographic Fabry-Perot filters, part III: holographic Fabry-Perot filters," W. Wang, (E. Wolf, faculty investigator), Appl. Opt. **33**, 7883-7894 (1994). **(78)***

"Far-zone behavior of focused fields in systems with different Fresnel numbers," W. Wang and E. Wolf, Opt. Comm. **119**, 453-459 (1995). **(82)**

*File number for cumulative listing.

"Generalized Fresnel transforms in optics," D. F. V. James and G. S. Agarwal, (E. Wolf, faculty investigator), in press, J. Mod. Opt. (1994). **(83)**

"Spectral invariance and non-invariance of light generated by partially coherent sources," E. Wolf, J. Appl. Phys. B. **60**, 303-308 (1995). **(95)**

"Structure of focused fields in systems with large Fresnel numbers," W. Wang, A. T. Friberg, and E. Wolf, J. Opt. Soc. Am. A. **12**, 1947-1953 (1995). **(96)**

"Principles and development of diffraction tomography," E. Wolf, Trends in Optics, ed. by A. Consortini (Academic Press, San Diego, CA), 83-110. (1996). **(109)**

"Homogeneous and evanescent contributions in scalar near-field diffraction," M. Kowarz, (E. Wolf, faculty investigator), Appl. Opt. **34**, 3055-3063 (1995). **(139)**

"Bessel-beam representation for partially coherent fields," M. W. Kowarz and G. S. Agarwal, (E. Wolf, faculty investigator), J. Opt. Soc. Am. A. **12**, 1324-1330 (1995). **(140)**

"Transmission properties of holographic Fabry-Perot filters," W. Wang, (E. Wolf, faculty investigator), Proceedings of Conference on Applications and Theory of Periodic Structures, part of SPIE's 1995 International Symposium on Optical Science, Engineering and Instrumentation, San Diego, CA, July (1995). **(141)**

"Focusing of partially coherent light in systems of large Fresnel numbers," W. Wang, A. T. Friberg, and E. Wolf, J. Opt. Soc. Am. A. **14**, 491- 496 (1997). **(142)**

"Correlation-induced spectral changes," E. Wolf and D. F. V. James, Reports on Progress in Physics (IOP Publishing, Bristol and London), **59**, 771-818 (1996). **(146)**

"Cross-spectrally pure light and the spectral modulation law," D. F. V. James and E. Wolf, Opt. Comm. **138**, 257-261 (1997). **(167)**

"Theory of diffraction tomography for quasi-homogeneous random objects," D. G. Fischer and E. Wolf, Opt. Comm. **133**, 17-21 (1997). **(218)**

"Sources of arbitrary state of coherence which generate completely coherent fields outside the source," G. Gbur and E. Wolf, Opt. Lett. **22**, 943-945 (1997). **(219)**

"Scattering in the presence of field discontinuities at boundaries," T. Visser and E. Wolf, Phys. Lett. A, in press. **(220)**

"Remarks on boundary conditions for scalar scattering," T. D. Visser, P. S. Carney, and E. Wolf, submitted to Physics Letters A. **(221).**

*File number for cumulative listing.

ARO-URI PH.D. FELLOWS

The ARO-URI Center for Opto-Electronic Systems Research was established to contribute fundamental knowledge in the key technology areas of signal processing and image understanding, sources and sensors, and optical system design. A primary goal of the Center has been the education of outstanding Ph.D. graduate students through its affiliation with The Institute of Optics. Todate, sixty Ph.D. Fellows have been supported since the beginning of the ARO-URI Center Program (1988). Of those, fifty have completed their theses and ten are in the process of finishing. This section contains a listing of the Ph.D. Fellows. Their thesis title is given along with their advisor and the year the thesis was completed or is expected. For those Fellows who have graduated, we also include their current location.

ARO-URI Center for Opto-Electronic Systems Research

Listing of Ph.D. Fellows

Title / Fellows / Advisor	Year	Current Address
"Contributions to the theory of the electronic and optical properties of Sii-Ge_x-Si_{1-x} semiconductor superlattices" **Carel Martijn de Sterke** Dennis G. Hall, Advisor	1987	University of Sydney Theoretical Physics Department Sydney, Australia NSW 2006
"Diffraction theory for polygonal apertures" **R. Edward English, Jr.** Nicholas George, Advisor	1988	Lawrence Livermore National Laboratory P. O. Box L-462 Livermore, CA 94550 (510) 422-3602
"Two-beam coupling and phase conjugation by resonant nonlinear optical interactions" **Mark Tyree Gruneisen** Robert W. Boyd, Advisor	1988	U.S.A.F. Phillips Laboratory PL/LITN Kirtland Air Force Base 3550 Aberdeen Avenue, SE Albuquerque, NM 87117-6008 (505) 846-4730
"Image recovery from partial Fresnel zone information" **Robert J. Rolleston** Nicholas George, Advisor	1988	Xerox Corporation Webster Research Center 800 Phillips Road, 0128-27E Webster, NY 14580 (716) 422-3138

LISTING OF PH.D. FELLOWS (CONTINUED)

TITLE / FELLOW / ADVISOR	YEAR	CURRENT ADDRESS
"Laser speckle from thin and cascaded diffusers" **Lyle Gordon Shirley** Nicholas George, Advisor	1988	MIT Lincoln Laboratory P. O. Box 73-KB370 Lexington, MA 02173 (617) 981-0774
"Optical phase conjugation enhanced by the Brillouin interaction" **Mark Daniel Skeldon** Robert W. Boyd, Advisor	1988	Laboratory for Laser Energetics University of Rochester Rochester, NY 14627 (716) 275-4781
"Sol-gel method for making radial gradient-index glass" **J. Brian Caldwell** Duncan T. Moore, Advisor	1989	Enichem American, Inc. 2000 Princeton Park Monmouth Junction, NJ 08852 (908) 422-0400
"Instabilities and chaos of laser beams propagating through nonlinear optical medium" **Daniel Joseph Gauthier** Robert W. Boyd, Advisor	1989	Duke University Department of Physics Durham, NC 27706
"Quantum-limited image recognition" **Thomas Arthur Isberg** G. Michael Morris, Advisor	1989	3M Company 3M Center Bldg. 201-3E-03 St. Paul, MN 55144-1000 (612) 733-1110

Listing of Ph.D. Fellows (continued)

Title / Fellow / Advisor	Year	Current Address
"Dynamics and instabilities in homogeneously broadened lasers" **Karl William Koch, III** Carlos R. Stroud, Jr., Advisor	1989	U.S.A.F. Phillips Laboratory PL/LIDN Kirtland Air Force Base 3550 Aberdeen Avenue, SE Albuquerque, NM 87117-6008 (505) 846-4750
"Interaction of atomic hydrogen with pico- and femtosecond laser pulses" **Jonathan S. Parker** Carlos R. Stroud, Jr., Advisor	1989	University of Maryland NIST College Park, MD (301) 405-1000
"Classification techniques for quantum-limited and classical-intensity images" **Miles N. Wernick** G. Michael Morris, Advisor	1989	Illinois Institute of Technology Electrical Engineering Department 3301 South Dearborn Chicago, IL 60616
"Serrated circular apertures: optical fourier transforms and fractal analysis" **Madeleine Marie Beal** Nicholas George, Advisor	1990	3M Company 3M Center Bldg. 260-5A-11 St. Paul, MN 55144-1000 (612) 736-9287
"Optical emission from single-crystal silicon" **Phillip Laurence Bradfield** Dennis G. Hall, Advisor	1990	Consultant

LISTING OF PH.D. FELLOWS (CONTINUED)

TITLE / FELLOW / ADVISOR	YEAR	CURRENT ADDRESS
"Nonlinear optical systems interacting with amplitude-modulated optical fields" **Stephen H. Chakmakjian** Carlos R. Stroud, Jr., Advisor	1990	U.S.A.F. Phillips Laboratory Nonlinear Optics Branch Kirtland Air Force Base Albuquerque, NM 87117-6008 (505) 822-7000
"Effects and control of the correlation properties of light sources" **Dean Faklis** G. Michael Morris, Advisor	1990	Rochester Photonics Corporation 330 Clay Road Rochester, NY 14623 (716) 272-3010
"Stochastic and deterministic fluctuations in stimulated brillouin scattering" **Alexander L. Gaeta** Robert W. Boyd, Advisor	1990	Cornell University Applied & Engineering Physics Ithaca, NY 14853 (607) 255-9983
"Fabrication and testing of index gradients in fluoride materials" **Michael T. Houk** Duncan T. Moore, Advisor	1990	Burleigh Instruments, Inc. Burleigh Park Fishers, NY 14453 (716) 924-9355
"Radial gradient lenses for single-mode optical systems" **John P. Bowen** Duncan T. Moore, Advisor	1991	Rochester Photonics 330 Clay Road Rochester, NY 14623 (716) 272-3010

LISTING OF PH.D. FELLOWS (CONTINUED)

TITLE / FELLOW / ADVISOR	YEAR	CURRENT ADDRESS
"Pulse shaping in colliding-pulse, mode-locked dye lasers" **Mark K. Beck** Ian A. Walmsley, Advisor	1992	University of Oregon Department of Physics Eugene, OR 97403 (503) 346-4751
"Single point diamond turning of glass" **Christian Gary Blough** Duncan T. Moore, Advisor Erwin G. Loewen, Advisor	1992	Rochester Photonics 330 Clay Road Rochester, NY 14623 (716) 272-3010
"Recovery of particle size distributions from the far field scattering pattern" **Scott D. Coston** Nicholas George, Advisor	1992	Bio-Derm, Inc. Clearwater, FL
"Wave guiding and grating coupling phenomena in silicon based integrated optics" **Robert Milton Emmons** Dennis G. Hall, Advisor	1992	NiOptics Corp 1801 Maple Avenue Evanston, IL 60201 (708) 491-3196
"Propagation, loss and free-carrier effects in silicon waveguide structures" **Alan Frank Evans** Dennis G. Hall, Advisor	1992	Corning Inc. Sullivan Park, SP-FR-01-7 Corning, NY 14831 (607) 974-3947

Listing of Ph.D. Fellows (continued)

Title / Fellow / Advisor	Year	Current Address
"Global optimization in lens design" **Andrew E. W. Jones** Gregory W. Forbes, Advisor	1992	Sinclair Optics Inc. 6780 Pittsford-Palmyra Road Fairport, NY 14450 (716) 425-4380
"An investigation of distributed coupling in a nonlinear semiconductor waveguide" **David Floyd Prelewitz** Thomas G. Brown, Advisor	1992	University of Rochester Electronic Imaging Systems Rochester, NY 14627 (716) 275-0547
"Feedforward neural networks" **Lennart A. Saaf** G. Michael Morris, Advisor	1992	IBM East Fishkill Facility Fishkill, NY 12524 (914) 894-8554
"Hamilton's methods applied to the design of asymmetric optical systems" **Bryan D. Stone** Gregory W. Forbes, Advisor	1992	University of Rochester The Institute of Optics Rochester, NY 14627 (716) 275-6205
"Design methods for gradient-index optical systems" **David Yih-Hsing Wang** Duncan T. Moore, Advisor	1992	Co. Breault Research 7820 East Broadway, Suite 207 Tucson, AZ 85710 (602) 721-0500

LISTING OF PH.D. FELLOWS (CONTINUED)

TITLE / FELLOW / ADVISOR	YEAR	CURRENT ADDRESS
"Nonlinear optical modification to the polarization and noise properties of a laser beam after propagating through atomic-potassium vapor" **William V. Davis** Robert W. Boyd and Leonard Mandel, Advisors	1993	Eastman Kodak Company 3/81/RL MC02017 Rochester, NY 14650 (716) 588-6318
"Group III-vacancy mediated disordering of intrinsic and n-type AlGaAs/GaAs" **Brian L. Olmsted** Susan N. Houde-Walter, Advisor	1993	University of Georgia Dept. Physics & Astronomy Athens, GA 30602 (706) 542-2485
"Subwavelength structured surfaces: theory and experiments" **Daniel Henri Raguin** G. Michael Morris, Advisor	1993	Rochester Photonics Corporation 330 Clay Road Rochester, NY 14623 (716) 272-3010
"Wavelength and roughness dependence of backscattering" **Donald John Schertler** Nicholas George, Advisor	1993	University of Rochester The Institute of Optics Rochester, NY 14627 (716) 275-5805
"Optical absorption, emission, and modulation in III-V semi-conductor quantum well structures" **Steven Marc Shank** Gary W. Wicks, Advisor	1993	Galileo Electro-Optics Ithaca, NY

Listing of Ph.D. Fellows (continued)

Title / Fellow / Advisor	Year	Current Address
"Experimental determination of the dynamics of a molecular nuclear wave packet via the spectra of a spontaneous emission" **Thomas J. Dunn** Ian A. Walmsley, Advisor	1994	Anvik Corporation 250 Clearbrooke Road Elmsford, NY 10523 (914) 345-2442
Spatial optical transforms with applications" **Keith Bryan Farr** Nicholas George, Advisor	1994	Advanced Optical Systems, Inc. 3330 L&N Drive, Suite A Huntsville, AL 35801 (205) 650-5960
"Semiclassical dynamics of Rydberg electron wave packets" **Mark R. Mallalieu** Carlos R Stroud, Jr., Advisor	1994	University of Kansas Department of Chemistry Lawrence, KS 66044
"Resonant interactions of atoms with modulated optical fields" **Stephanos Papademetriou** Carlos R. Stroud, Jr., Advisor	1994	Indigo Medical Incorporated 2309 Renard Place, S.E. Suite 104 Albuquerque, NM 87106 (505) 765-0488
"Modal expansions in transparent and nontransparent planar waveguides" **Robert Edward Smith** Susan N. Houde-Walter, Advisor	1994	Sandia National Laboratory Albuquerque, NM
"Image processing, coding, and compression with multiple-point impluse response functions" **Bryan Joseph Stossel** Nicholas George, Advisor	1994	Eastman Kodak Company Research Laboratories Rochester, NY (716) 726-3412

LISTING OF PH.D. FELLOWS (CONTINUED)

TITLE / FELLOW / ADVISOR	YEAR	CURRENT ADDRESS
"Ultrafast stimulated Raman scattering in optical fibers" **Clifford Headley** Govind P. Agrawal, Advisor	1995	AT&T Bell Laboratories Murray Hill, NJ 07974
"Diffraction effects in the near field" **Marek Kowarz** Emil Wolf, Advisor	1995	Eastman Kodak Company Optical Storage Technology R&D 460 Buffalo Road Rochester, NY 14652-3815 (716) 588-4160
"Periodic structures in multiwavelength optical systems" **Stojan Radic** Nicholas George, Advisor	1995	University of Rochester The Institute of Optics Rochester, NY 14627 (716) 275-7834
"Aspects of the generation and propagation of solitons in optical fibers" **Andrew Stentz** Robert W. Boyd, Advisor	1995	AT&T Bell Laboratories Murray Hill, NJ
"Novel asymptotic methods for wave-propagation" **Miguel Angel Alonso** Gregory W. Forbes, Advisor	1996	Macquarie University School of MPCE North Ryde, 2109 Sydney, Australia

LISTING OF PH.D. FELLOWS (CONTINUED)

TITLE / FELLOW / ADVISOR	YEAR	CURRENT ADDRESS
"Methods of inverse scattering for random media" **David Gerard Fischer** Emil Wolf, Advisor	1996	Johns Hopkins University Applied Physics Laboratory Johns Hopkins Road, Rm. 1E-147 Laurel, MD 20723 (410) 792-5000, x4860
"Ion exchange and chemical structure in glass" **Jill Marie Inman** Susan N. Houde-Walter, Advisor	1996	Pacific-Sierra Research Corp. L.M.D.C. 12300 Sunrise Valley Drive Reston, VA 22091 (703) 453-3515
"Temporal, spectral, and noise characteristics of erbium-doped fiber amplifiers and lasers" **Lisa Liou** Govind P. Agrawal, Advisor	1996	Corning, Inc. Corning, NY
"Atomic electron wave packet interference and control" **Michael Noel** Carlos R. Stroud, Jr., Advisor	1996	University of Virginia Departmentof Physics Charlottsville, VA 22901
"Polarization-control components and narrow-band filters based on subwavelength grating structures" **Song Peng** G. Michael Morris, Advisor	1996	IBM Essex, VT

Listing of Ph.D. Fellows (continued)

Title / Fellow / Advisor	Year	Current Address
"Investigation of the third-order nonlinear optical response of composite materials" **Russell Jeffrey Gehr** Robert W. Boyd, Advisor	1997	Sandia National Laboratory Lasers, Optics & Remote Sensing Department Albuquerque, NM 87185 (505) 844-0854
"Ultrafast spatiotemporal coupling in nonlinear dispersive media" **Andrew T. Ryan** Govind P. Agrawal, Advisor	1997	Decan Research 2440 Embaracadero Street Palo Alto, CA 94303 (415) 493-6100
"Resonant grating structures: theory, design, and applications" **Scott Norton** G. Michael Morris, Advisor	1997	Seagate, Inc. California
"Angularly localized wave packets in one- and two-electron atoms" **James West** Carlos R. Stroud, Jr., Advisor	1997	Corning, Inc. Corning, NY
"On the resolution enhancement of optical beams with extreme focal depth" **Ronald L. Gordon** Gregory Forbes, Advisor	1997	Finle Technologies Austin, TX 78746 512-327-3781

LISTING OF PH.D. FELLOWS (CONTINUED)

TITLE / FELLOW / ADVISOR	YEAR	CURRENT ADDRESS
"Phase-only superresolution elements" **Tasso R. Sales** G. Michael Morris, Advisor	1997	Rochester Photonics Corporation 330 Clay Road Rochester, NY 14623 716-272-3010
"Static, dynamic, and noise characteristics of vertical-cavity surface-emitting lasers" **Joanne Y. Law** Govind A. Agrawal, Advisor	1997	Therma-Wave, Inc. 1250 Reliance Way Fremont, CA
"Classical limit state of an atom" **Michael Van Leeuwen** Carlos R. Stroud, Jr., Advisor	1998	University of Maryland Bethesda, MD

( ) Anticipated year of completion

LISTING OF PH.D. FELLOWS (CONTINUED)

TITLE / FELLOW / ADVISOR	YEAR	CURRENT ADDRESS
"Concentric-circle-grating lasers" **Pamela Greene** Dennis G. Hall, Advisor	(1999)	University of Rochester The Institute of Optics Rochester, NY 14627
"Automatic pattern recognition using an all digital ring-wedge detector" **David M. Berfanger** Nicholas George, Advisor	(1999)	University of Rochester The Institute of Optics Rochester, NY 14627
Diffractive optics for imaging spectrometers" **David J. Fischer** Duncan T. Moore, Advisor	(1999)	University of Rochester The Institute of Optics Rochester, NY 14627
"Terahertz pulses" **Jake Bromage** Carlos R. Stroud, Advisor	(1999)	University of Rochester The Institute of Optics Rochester, NY 14627
"Optical gain in rare-earth doped glasses" **Gina Jones** Susan Houde-Walter, Advisor	(2001)	University of Rochester The Institute of Optics Rochester, NY 14627
"Quantum computing" **Ashok Muthukrishnan** Carlos R. Stroud, Advisor	(2001)	University of Rochester Institute of Optics Rochester, NY 14627

( ) Anticipated year of completion